IMPORTANT

Before you remove the Wire-Seal, check the contents of this envelope with the listing on the front of the envelope. If any part is missing, your Howard W. Sams distributor will replace the entire PHOTOFACT set IF the Wire-Seal has not been damaged.

This PHOTOFACT Folder Set is

WIRE-SEALED FOR YOUR PROTECTION

to guarantee completeness of contents

DO NOT ACCEPT IF SEAL HAS BEEN BROKEN

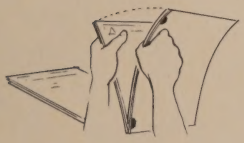
TO OPEN ***JUST DO THIS:***

1

Take hold of the Set with both hands. Place your thumbs directly under the top wire-seal; then, divide the contents equally by putting your thumbs midway through the thickness of the Set. Now, pull the two sections apart at the top, firmly.

2

Repeat this process, pulling close to the wire-seal at the bottom, so that the set is now divided into two equal parts.



3

Continue this "pulling-apart" process with the section in which the wire-seals remain, dividing it in half.

4

Finally, remove the wire-seals left in the last section; this can easily be done with your fingernail or any sharp instrument.

Your "Safety-Sealed" PHOTOFACT Set is now ready for profit-making use . . .

IMPORTANT

Before you remove the Wire-Seal, check the contents of this envelope with the listing on the front of the envelope. If any part is missing, your Howard W. Sams distributor will replace the entire PHOTOFACT set IF the Wire-Seal has not been damaged.

The PHOTOFACT® Servicer

SET 523 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ MARCH 1961

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ZENITH	
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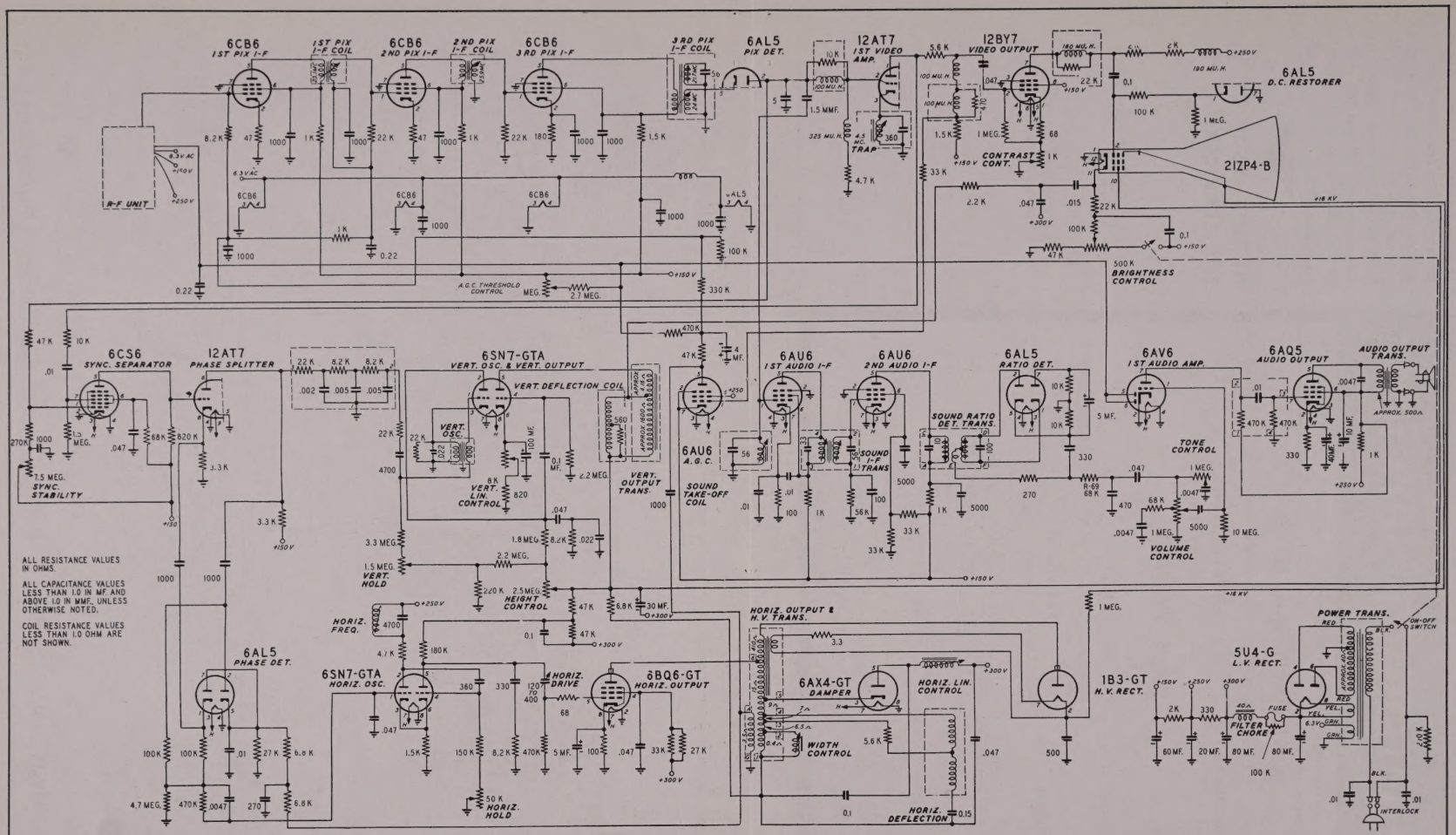
This Servicer provides you with essential data on other models or special equipment not covered in standard PHOTOFACT folders. The schematics and supplementary data included here will be of valuable help to you in servicing this equipment.

IN THIS ISSUE OF THE SERVICER:

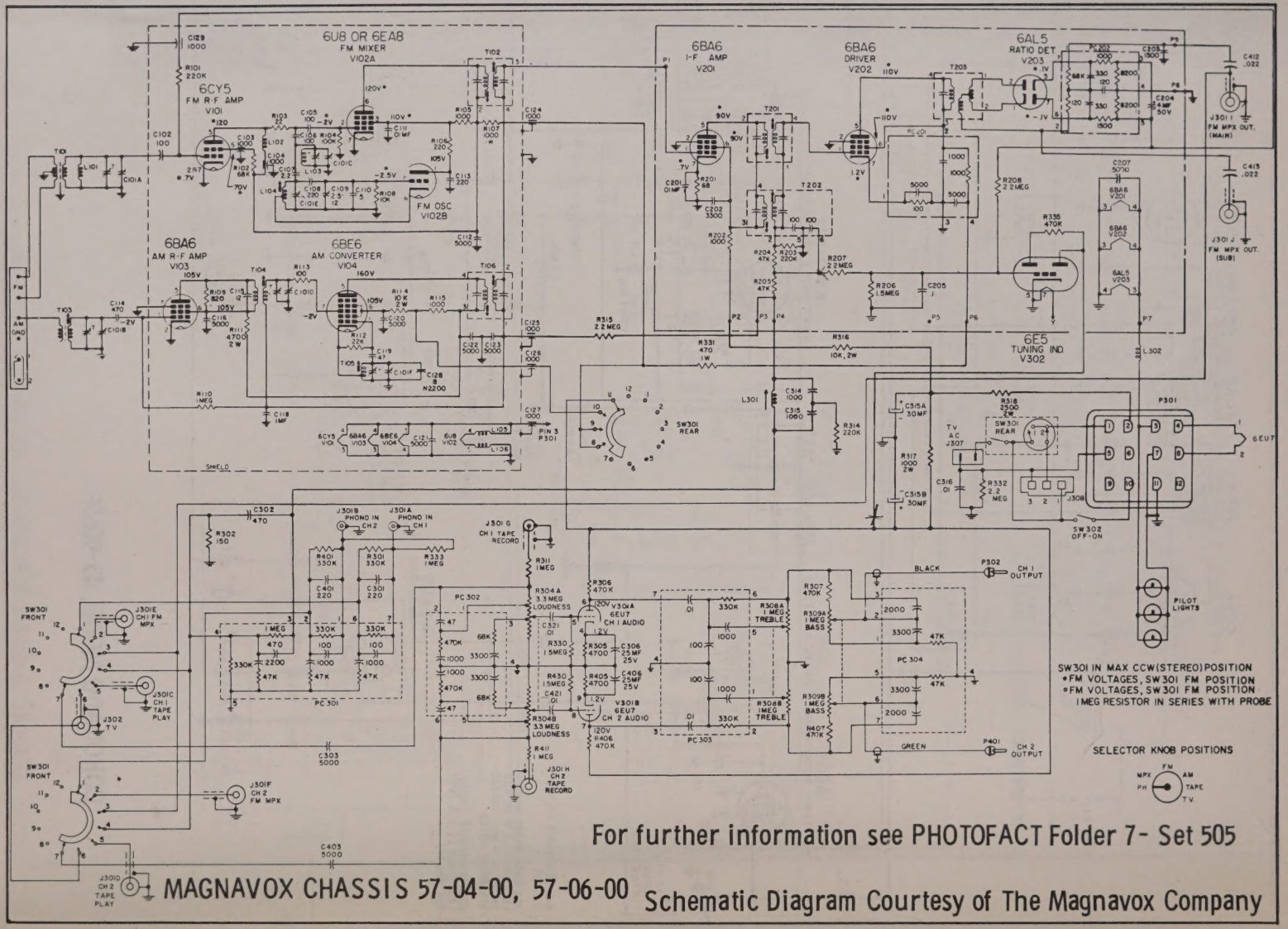
Coronado Model 43-9060F

Magnavox Chassis 57-04-00, 57-06-00



CORONADO MODEL 43-9060F

Schematic Diagram Courtesy of Gamble-Skogmo, Inc.



For further information see PHOTOFACT Folder 7- Set 505

MAGNAVOX CHASSIS 57-04-00, 57-06-00 Schematic Diagram Courtesy of The Magnavox Company

PHOTOFACT® Folder

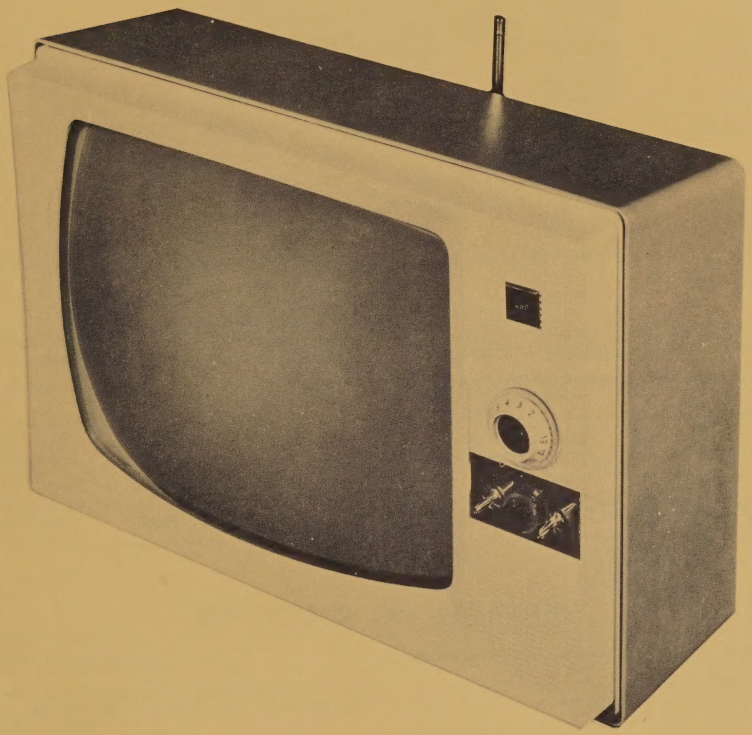
**BRADFORD MODEL
WGEC-89458**

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

BRADFORD MODEL
WGEC-89458



MODEL WGEC-89458

BRADFORD MODEL
WGEC-89458

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1961 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

PHOTOFACT® Folder

BRADFORD MODEL WGEC-89458

MODEL WGEC-89458

CAUTION

ONE SIDE OF AC LINE CONNECTED TO CHASSIS.

Care should be exercised when connecting test equipment or physically contacting chassis. Isolation devices employed by manufacturer should be checked and properly connected before returning receiver to owner.

TRADE NAME	Bradford Model WGEC-89458
SUPPLIER	W. T. Grant Co. 1441 Broadway, New York, New York
TYPE SET	Television Receiver
TUBES	VHF - Fourteen, UHF - Fifteen
POWER SUPPLY	105-125 Volts AC, 60 Cycle RATING VHF: 150 Watts, 1.45 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

It is necessary to remove the chassis and picture tube for safety glass cleaning or removal. (See "Disassembly Instructions", page 16.)

FUSE DEVICE

A 7.5Ω fusible resistor is used for low voltage power supply protection. (For location, see "Tube Placement Chart".)

TUNER OSCILLATOR ADJUSTMENT

To touch up the VHF Oscillator, remove Channel Selector and Fine Tuning Knobs.

AGC

The AGC may be varied by means of an AGC Control. (For location, see "Tube Placement Chart".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal frequency slug is used for the Horizontal Hold. (For location, see "Tube Placement Chart".)

HORIZONTAL DRIVE

The horizontal drive may be varied by a Horizontal Drive trimmer (B1). (For location, see "Tube Placement Chart".)

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Buzz Control for MINIMUM buzz and maximum sound. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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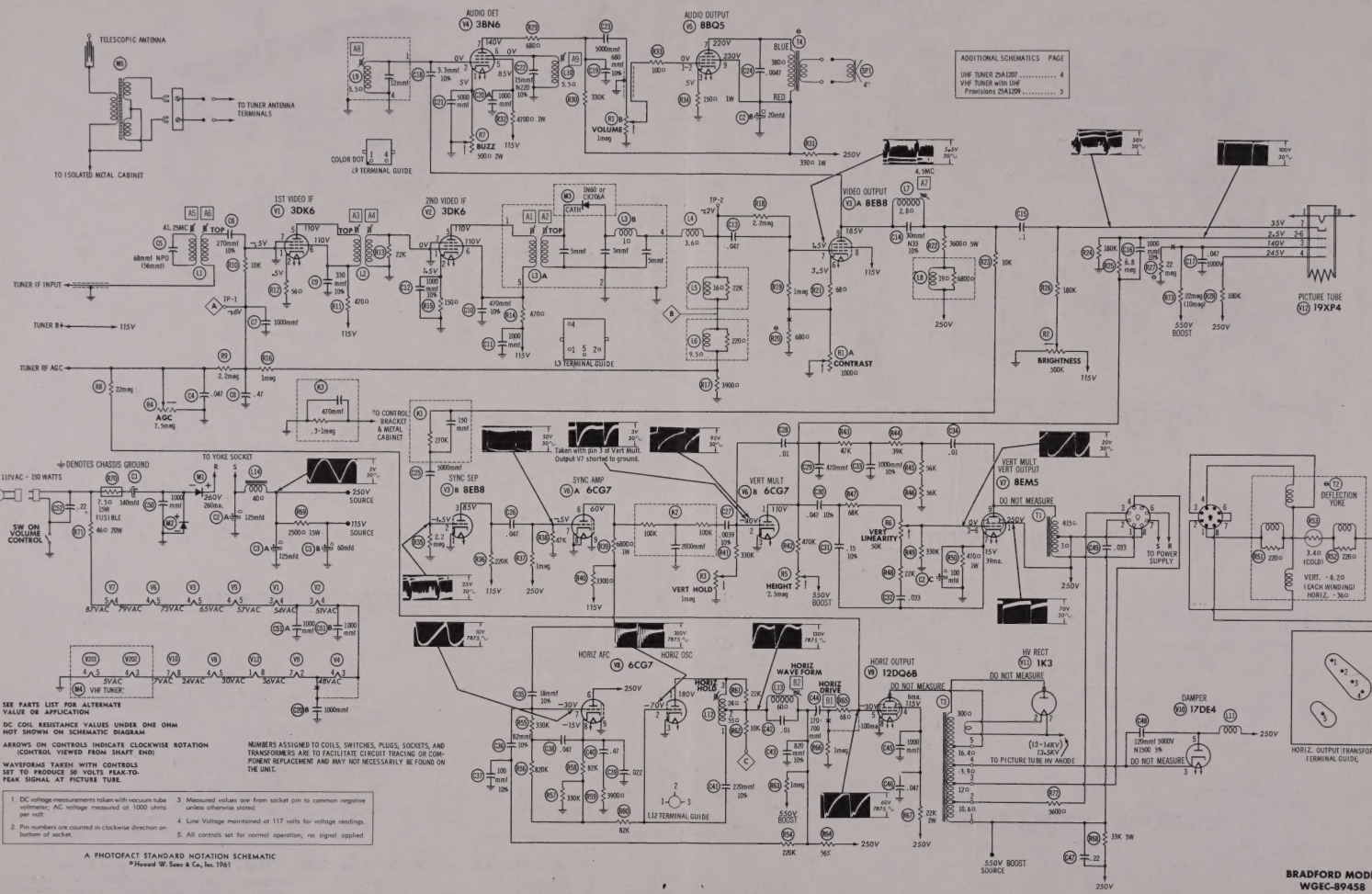
BRADFORD MODEL WGEC-89458

BRADFORD MODEL WGEC-89458

SET 523 FOLDER 1


TELESCOPIC ANTENNA
TO TUNER ANTENNA TERMINALS
TO ISOLATED METAL CABINET
AUDIO DET V4 3BN6
AUDIO OUTPUT V5 8BQ5
VOLUME 1meg
BUZZ 500Ω 2W
COLOR DOT
L9 TERMINAL GUIDE
ADDITIONAL SCHEMATICS PAGE
UHF TUNER 25A1207 4
VHF TUNER with UHF Provisions 25A1209 5
1ST VIDEO IF V1 3DK6
2ND VIDEO IF V2 3DK6
TUNER IF INPUT
TUNER B+ 115V
TUNER IF AGC
AGC 7.5meg
VIDEO OUTPUT V3 A 8EB8
CONTRAST 1000Ω
BRIGHTNESS 500K
PICTURE TUBE V12 19XP4
550V BOOST
250V
115V
TO CONTROL BRACKET & METAL CABINET
SYNC SEP V3 B 8EB8
SYNC AMP V6 A 6CG7
VERT MULT V6 B 6CG7
VERT MULT VERT OUTPUT V7 8EM5
DO NOT MEASURE
VERT LINEARITY 50K
VERT HOLD 1meg
HEIGHT 2.5meg
TO POWER SUPPLY
DEFLECTION YOKE
VERT. - 6.2Ω (EACH WINDING)
HORIZ. - 3Ω
DENOTES CHASSIS GROUND
TO YOKE SOCKET
117VAC - 150 WATTS
SW ON VOLUME CONTROL
FUSIBLE
HORIZ AFC V8 6CG7
HORIZ OSC
HORIZ HOLD
HORIZ WAVE FORM
HORIZ DRIVE
HORIZ OUTPUT V9 12DQ6B
HV RECT V11 1K3
TO PICTURE TUBE HV ANODE
DAMPER V10 17DE4
HORIZ. OUTPUT TRANSFORMER (TERMINAL GUIDE)
VHF TUNER
87VAC 79VAC 73VAC 65VAC 57VAC 54VAC 51VAC
5VAC 7VAC 24VAC 30VAC 36VAC 48VAC
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 30 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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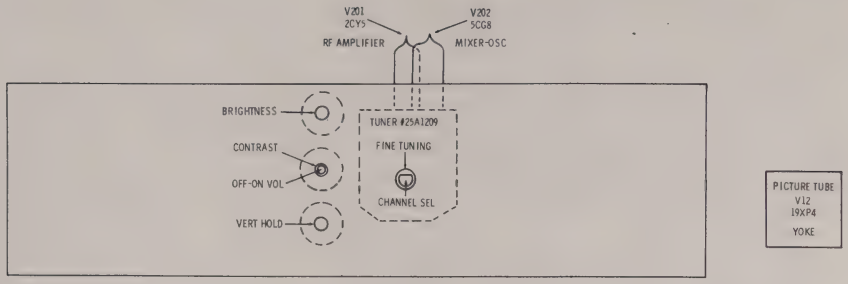
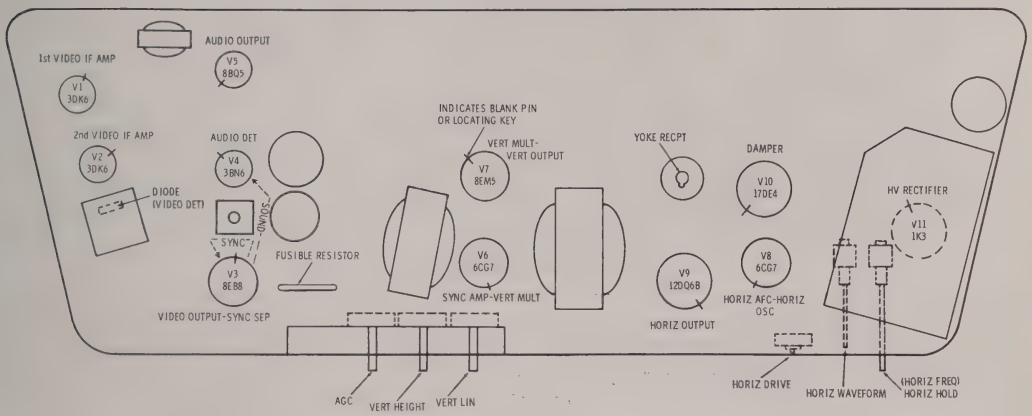
BRADFORD MODEL WGEC-89458

TUBE PLACEMENT CHART



TOP VIEW



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

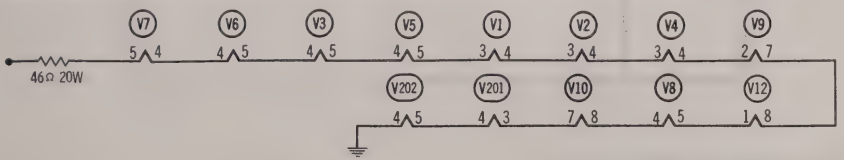
POWER SUPPLY FAILURE
No raster, no sound Fusible Resistor (B+), Rectifiers (B+)

SWEEP FAILURE
No raster, has sound V8, V9, V10, V11, V12
No vertical deflection V6, V7
Poor vert. linearity or foldover V6, V7
Poor horiz. linearity or foldover V8, V9, V10
Narrow picture V8, V9, V10, Rectifiers (B+)
Vert. off freq. V6, V7
Horiz. off freq. V8

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, Diode (Video Det.), V3
No pic, no sound, has snow V201, V202
No pic, has sound, has raster V3, V12
Has pic, no sound V4, V5

SYNC FAILURE
No vert. sync V3, V6
No horiz. sync V3, V6
No vert. or horiz. sync V3, V6

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



SET 523 FOLDER 1

BRADFORD MODEL WGEC-89458

FOLDER 1

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Use an ISOLATION TRANSFORMER TO PROTECT the Test Equipment.
The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Connect the negative lead of a 7 volt bias supply to point (A). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.01mfd	High side to pin 1 (grid) of 2nd Video IF. Low side to chassis. Adjust output for 4VP-P on scope.	44.0MC (10MC Swp)	42.4MC 45.75MC	Any non-interfering channel	Vert. Amp. thru 47K to point (B). Low side to chassis. (Across Video Det. load)	A1, A2	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown. A1 controls marker position and A2 controls gain and symmetry.
2.	"	High side to pin 1 (grid) of 1st Video IF. Low side to chassis. Adjust for 4VP-P on scope.	"	42.4MC 43.5MC 44.5MC 45.75MC	"	"	A3, A4	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown. A3 controls marker position and A4 controls gain and symmetry.
3.	Direct	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	"	41.25MC 42.4MC 43.5MC 44.5MC 45.75MC	"	"	A5, A6, & Mixer Plate Coil	Adjust for maximum gain and symmetry of response similar to Fig. 3 with markers as shown. Adjust A5 to place 41.25MC marker in trap notch.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.	.01mfd	High side to pin 2 (grid) of Video Output. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	AC probe to pin 7 (cathode) of picture tube. Common to chassis. Use 0-10V AC scale.	A7	Adjust for MINIMUM deflection.

SOUND IF ALIGNMENT

Tune in a TV station and reduce the signal strength at the antenna terminals until a hiss is heard in the sound similar to super-regeneration.
Adjust A8, A9 and the Buzz control for maximum undistorted sound with MINIMUM buzz.
If the hiss disappears during adjusting, further reduce the signal strength.

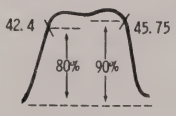


FIG.1

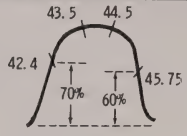


FIG.2

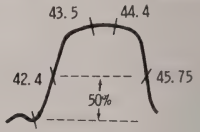
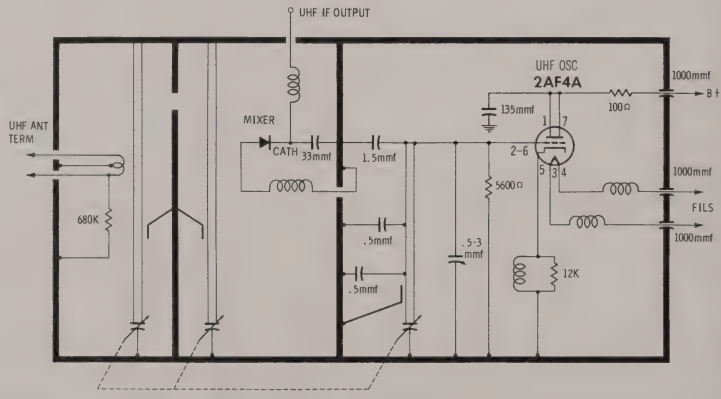


FIG.3



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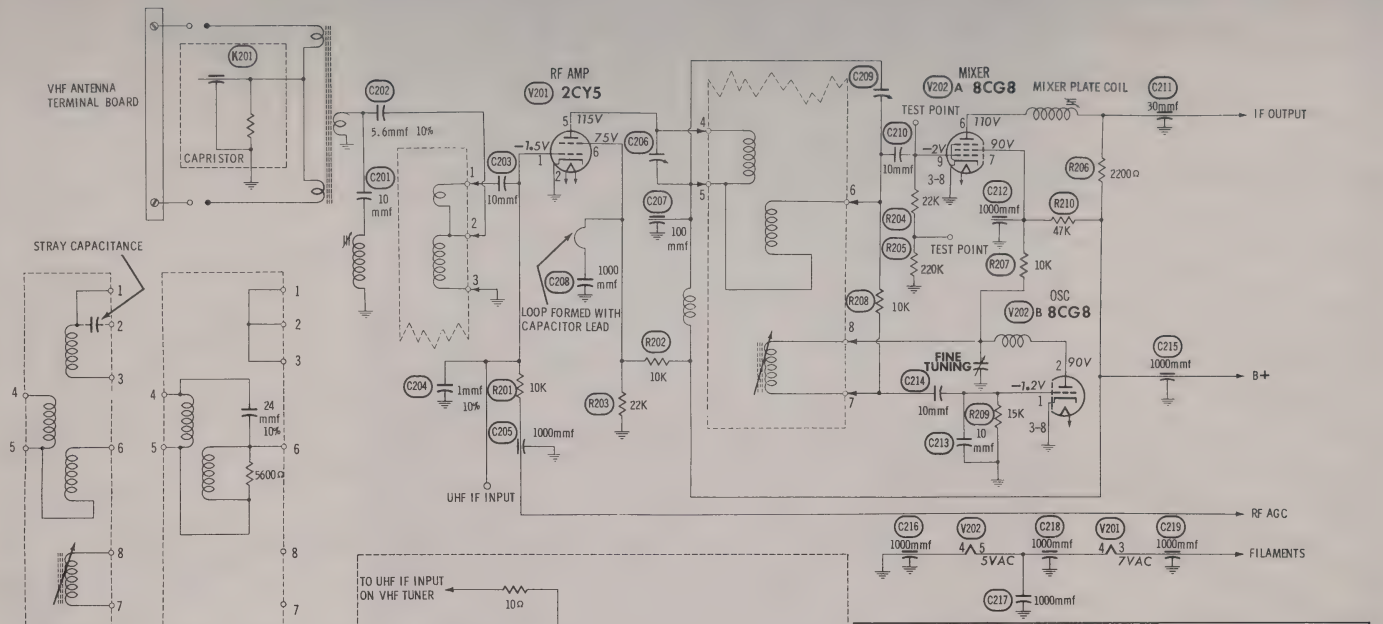
UHF TUNER 25A1207



TUNER ALIGNMENT

Suggested Alignment Tools: GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8729, 8967, 8988, 8989
WALSCO #2515, 2531, 2532

VHF OSCILLATOR ALIGNMENT

The individual channel adjustment screws are accessible one at a time, thru a hole in the front of the tuner, as the Channel Selector is rotated. Set the Fine Tuning to the center of its range and switch to channel to be adjusted and adjust for best picture and sound.

VHF RF AND MIXER ALIGNMENT

This portion of the tuner has been properly aligned at the factory and is very stable. Alignment of this portion should not be attempted in the field.

UHF TUNER ALIGNMENT

This portion of the tuner has been properly aligned at the factory and is very stable. Alignment of this portion should not be attempted in the field.

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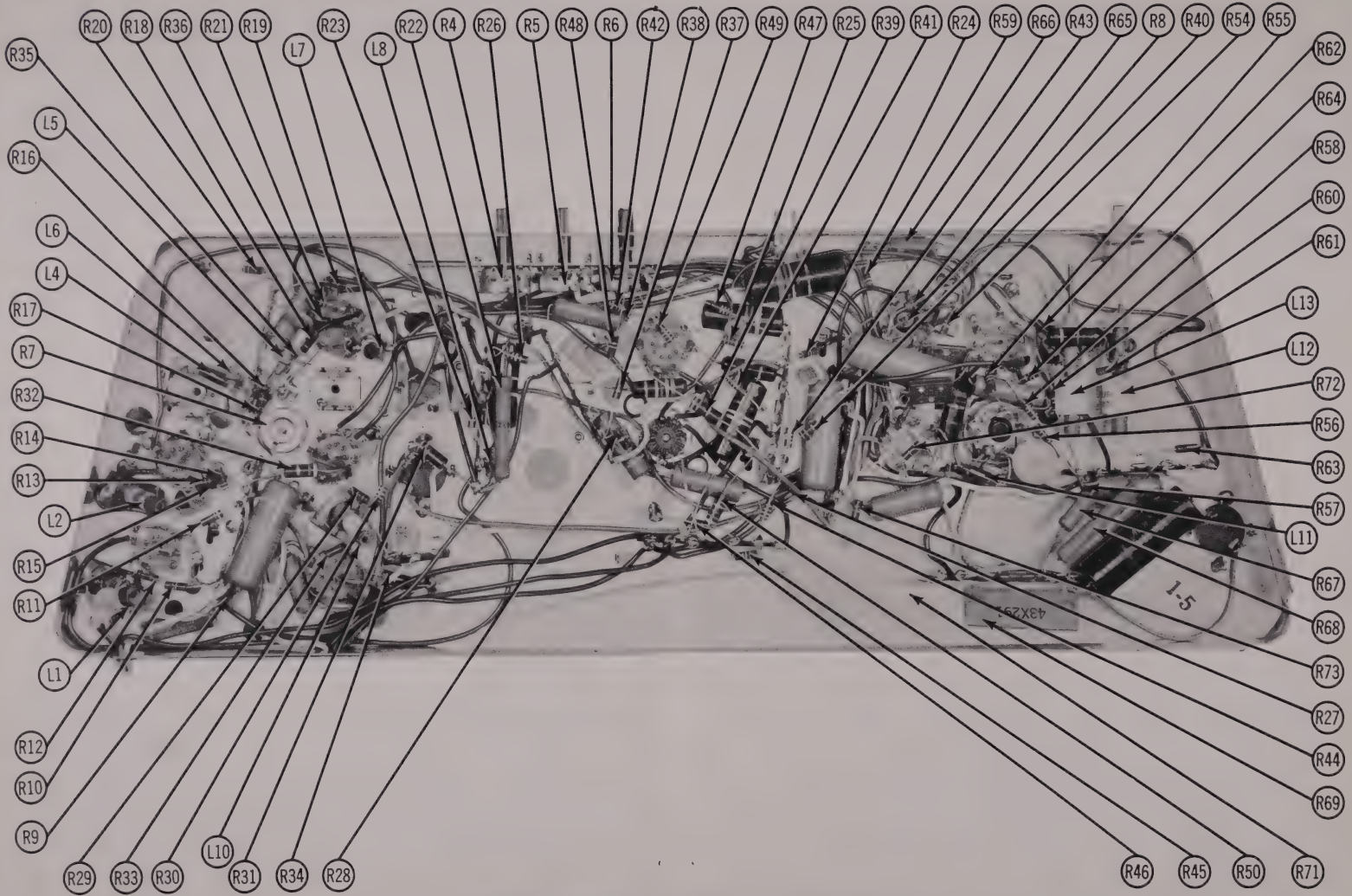
VHF TUNER with UHF Provisions - 25A1209



CHASSIS BOTTOM VIEW - RESISTOR & INDUCTOR IDENT.

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No	GENERAL ELECTRIC USE	GENERAL ELECTRIC TYPE	RAYTHEON USE	RAYTHEON TYPE	SYLVANIA USE	SYLVANIA TYPE
V1	1st Video IF Amp.	3DK8	V7	Vert. Mult. - Vert. Output	V8	8EM5
V2	2nd Video IF Amp.	3DK8	V8	Horiz. AFC - Horiz. Osc.	V9	6CG7
V3	Video Output - Sync Sep.	6EB8	V9	Horiz. Output	V10	12DQ8B
V4	Audio Det.	3BN6	V10	Damper	V11	17DE4
V5	Audio Output	6BQ6	V11	HV Rectifier		1K3
V6	Sync Amp. - Vert. Mult.	6CG7				

PICTURE TUBE

ITEM No.	REPLACEMENT DATA: BRADFORD PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
V12	19XP4		19XP4 ①		19XP4 ③	① Aluminized ② Silver Screen "85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP	RATING: VOLT	REPLACEMENT DATA: BRADFORD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	140	150	45X421	AFHR-33	XA0281	FF1T	TMS-1270	TVL-1438	
C2A	⌀125	300	45X478	AFHS3-99-80	D0930	FP420.26	TMQ-4277	TVL-3574.5	
B	⌀20	300							
C	⌀100	50							
C3A	⌀125	300	45X467	AFH3-99-83	D0046	FP326.75	TMT-3310	TVL-3574.6	
B	⌀80	300							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	.047	200V			P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C5	68	NPO		† (58)	NPO-DI 68	DTZ-68	CIOQ68C	CCTO-680	CNO-468	10TCC-Q68
C6	270		10%		DI-270	DD-270	L2Y27	CCD-271	GP327	10TS-T27
C7	1000				BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C8	.47	200V			P288N-47		CUB2P47	2DP-3-474	GEM-2047	2TM-P47
C9	330		10%		DI-330	DD-331	L3Y33	CCD-331	GP333	10TS-T33
C10	470		10%		DI-470	DD-471	5R5T47	CCD-471	GP347	10TS-T47
C11	1000				BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C12	1000		10%		DI-1000	DD-102	5R5D1	CCD-102	GP310	5HK-D10
C13	.047	300V			P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C14	30	N33	10%	#47X669				*		
C15	.1	400V			P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C16	1000		10%		DI-1000	DD-102	5R5D1	CCD-102	GP210	10TS-D10
C17	.047	1000V			P10S47-047		CUB10S47	10DP-3-473	GEM-10147	10TM-S47
C18	3.3		10%		NPO-SI 3.3	TCZ-3R3	C10Y33C	CCTO-3R3	CNO-333	10TCC-Y33
C19	680		10%		DI-680	DD-681	5R6T68	CCD-681	GP368	10TS-T68
C20A	1000							CCD-102		
B	1000				BPD-2X001	DD3-102	BYD6D01	CCD-102	B2X210	5HK-2X10
C21	5000				BPD-005	DD-502	BYA10D6	CCD-502	B-250	5HK-D50
C22	15	N220	10%	#47X672				*		10TCR-Q25
C23	5000				BPD-005	DD-502	BYA10D6	CCD-502	B-250	5HK-D50
C24	.0047	600V			P688N-0047	DD-472	CUB6D47	6DP-3-472	GEM-6247	6TM-D47
C25	5000				BPD-005	DD-502	BYA10D6	CCD-502	B-250	5HK-D50
C26	.047	400V			P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C27	.0039	400V	10%		P934CM-0039		DPM2S1D39	6DP-1-392	GEM-1634	6PS-D39
C28	.01	400V			P488N-01	DS-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C29	470		10%		DI-470	DD-471	5R5T47	CCD-471	GP347	10TS-T47
C30	.047	600V	10%		V84C847-10%		PM6S47	6DP-3-473	GEM-1615	6TM-S47
C31	.15	200V	10%		V84C2P15-10%		PM2P15	2DP-3-154	GEM-3015	2TM-P15
C32	.033	200V			P288N-033	DD-303	CUB2S33	2DP-3-333	GEM-4133	2TM-S33
C33	1000		10%		DI-1000	DD-102	5R5D1	CCD-102	GP210	10TS-D10
C34	.01	600V			P688N-01	DS-103	CUB6S1	6DP-1-103	GEM-611	6TM-S10
C35	18		10%		1469-000018	TCZ-18	22R5Q18	CM-19B-180K	CNO-418	MS-418
C36	82		10%		1469-000082	TCZ-82	22R5Q82	CM-19B-820K	CNO-482	MS-482
C37	100		10%		1469-0001	TCZ-100	22R5T1	CM-19B-101K	MCB225	MS-51
C38	.047	300V			P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C39	.022	200V			P288N-022	DD-303	CUB4S22	4DP-3-223	GEM-4122	2TM-S22
C40	.47	200V			P288N-47		CUB2P47	2DP-3-474	GEM-2047	2TM-P47
C41	220		10%		1469-00022	TCZ-220	22R5T22	CM-19B-221K	CNO-322	MS-322
C42	.01	400V			P488N-01	DS-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C43	820		10%		1469-00082		22R5T82	CM-19B-821K	MCB251	MS-382
C44	170-700			#47A376				469		
C45	1000				BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C46	.047	400V			P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C47	.33	600V			P688N-33		CUB6P33	6DP-5-224	GEM-6022	6TM-P22
C48	120	5000V	NPO 5%	#80X98-2						
C49	.033	600V			P688N-033	DD-303	CUB6S33	6DP-3-333	GEM-6133	6TM-S33
C50	1000				BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C51A	1000							CCD-102		
B	1000				BPD-2X001	DD3-102	BYD6D01	CCD-102	B2X210	5HK-2X10
C52	.22	400V			P488N-22		CUB4P22	4DP-5-224	GEM-4022	4TM-P22

† Alternate Value.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
# Bradford Part Number.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BRADFORD PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω	½	78X40	F1-5	RTV-727	† QJ-1530	■ UX4206-8	Contrast
B	1meg			R2-51				Volume
C	Switch			ER-1				Power Off-On

CONTROLS (cont)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BRADFORD PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R2A	500K	½	40X496	B-59	A47-500K-B	Q1-133	U50	Brightness
B	Shaft			Not Req.	FS-1	Not Req.	Not Req.	
R3A	1meg	½	40X497	B-69	A47-1meg-B	Q1-127	U54	Vert. Hold
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R4	7.5meg *		40X496					AGC
R5	2.5meg	½	40X465-1	TT-83	B47-2.5meg-S	HLC2	SU-585	Height
R6A	50K		40X467-2	TT-51	B47-50K-S	BU-133	PTA54L	Vert. Linearity
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R7	500Ω	2(WW)	40X472	WH-501	2S-500	113-500	PFL500	Buzz

† "CONCENTRIKIT" Equivalent: K-4 Kit with Base Elements and Shafts: B1T-108, P10-110 (Panel) B1U-137, R1-130 (Rear) 76-1 (Switch)

■ "STA-LOC" Equivalent: FA1SR, RU16L, OF1S12, 1SR937, US-41.
* Open at low (left hand end).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	WORKMAN TV PART No.	REMARKS
R8	22meg			
R9	2.2meg			
R10	10K			
R11	470Ω			
R12	56Ω			
R13	22K			
R14	470Ω			
R15	150Ω			
R16	1meg			
R17	3900Ω			
R18	2.2meg			
R19	1meg			Note 1
R20	680Ω			
R21	68Ω			
R22	3600Ω 5W	PW5 3600Ω	5G 3600Ω	#43X331
R23	10K			
R24	180K			
R25	6.8meg			
R26	180K			
R27	22meg			Note 1
R28	100K			
R29	680Ω			
R30	330K			
R31	330Ω 1W			
R32	4700Ω 1W			
R33	100Ω			
R34	150Ω 1W			
R35	2.2meg			
R36	220K			
R37	1meg			
R38	47K			
R39	68000Ω 1W			
R40	3300Ω			

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	WORKMAN TV PART No.	REMARKS
R41	330K			
R42	470K			
R43	47K			
R44	39K			
R45	56K			
R46	56K			
R47	68K			
R48	22K			
R49	330K			
R50	470Ω 1W			
R51	220Ω			
R52	220Ω			
R53	2.4Ω (Cold)			
R54	220K			
R55	330K			
R56	820K			
R57	330K			
R58	82K			
R59	3900Ω			
R60	82K			
R61	22K			
R62	10K			
R63	1meg			
R64	56K			
R65	68Ω			
R66	1meg			
R67	22K 2W			
R68	33K 5W	PW5 33K	5G 33K	
R69	2500Ω 15W		15W SQ 2500Ω	#43X291
R70	7.5Ω 15W	FR 7.5	RT	#43X397
R71	46Ω 30W		20W SQ 46Ω	#43X311
R72	5600Ω			
R73	22meg			* (10meg)

♦ Bradford Part Number.
Note 1. May not be used in some versions.
† Fusible Type.
* Alternate Value.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	BRADFORD PART No.	REPLACEMENT DATA
K1	Sync Sep. Grid	150mmf, 270K	76X15	
K2	Vert. Integrator	2000mmf, 100K, 100K	76X19	
K3	Isolation	470mmf, .3-1meg	76X16	Centralab RC-471 Sprague AC1-1

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: BRADFORD PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	NOTES
L1A	1st Video IF	9A2436	TV-156				① Includes Complete Assy.
B	41.25MC Trap						② Wound on 22K Resistor.
L2	2nd Video IF	9A2444					③ Wound on 2.2Ω Resistor.
L3A	3rd Video IF	9A2465 ①					④ Wound on 6800Ω Resistor.
B	RF Choke						* Parallel with 22K Res.
L4	RF Choke (7.5uh)	9A2432	BC-565	4611	RTC-8521	T859	▲ Parallel with 2200 Res.
L5	Peaking (390uh)	38A22 ②	TV-199 *	6155 *	RTC-8527 *	T318 *	† Parallel with 6800Ω Res.
L6	Peaking (110uh)	38A19 ③	TV-182 ▲	6153 ▲	RTC-8585 ▲	T307 ▲	
L7	4.5MC Trap	9A2365	TV-151	1489	RTC-8603	T249	
L8	Peaking (350uh)	38A28 ④	TV-190 †	6132 †	RTC-8577 †	T319 †	
L9	Sound Takeoff	9A2434	TV-154	1470-A	RTC-8604	T247	
L10	Quadrature	9A2367	TV-121	1480	RTC-8605	T251	
L11	RF Choke (1.5uh)	9A2380	BC-562	4604	RTC-8516	T858	

COILS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: BRADFORD PART No.	Merit PART No.	Miller PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	Workman TV PART No.
L12	Horiz. Osc.	9A2481							
L13	Horiz. Stabilizer	9A2372	MWC-12	6315	QRC104	RTC-8628	HS-8	WLC-3	T110

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	RATINGS: DC RES.	RATINGS: INDUCTANCE @ CURRENT 1000 (%)	REPLACEMENT DATA: BRADFORD PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
L14	.260A	40Ω	1 Hy.	52X104-2	C-2996 ①	C-2343 ①	26C44	C-38X	① Drill new mounting hole(s).

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: BRADFORD PART No.	Merit PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	Vert. Output	51X191-2						
T2	Yoke (Horiz. 19.6MH) 114° (Vert. 12MH)	9A-3477-A ①		PCM-2017 ②③④	DY-27A ②③④	Y-52 ②	Y-80-1 ③	
	Alt. Yoke	9A-3477 ①						
	Yoke Clamp	30X628						
T3	Horiz. Output	53X390						

① Includes rear cover, centering device and vert. damping resistor.
② Connect same as original.
③ Use original yoke damping network if necessary.
④ Requires new rear cover and centering device.
⑤ Remove 470Ω resistor across vert. windings, Connect same as original.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: BRADFORD PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T4	6000Ω	3-4Ω	51X206A *	A-3026	A-3677①	34S48	S-48X	① Drill new mounting hole(s). * Alternate Pt. #51X206.

SPEAKER

ITEM No.	TYPE: SIZE	TYPE: FIELD	TYPE: V. C. IMP.	REPLACEMENT DATA: BRADFORD PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	12AS80	4A07	

POWER RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: BRADFORD PART No.	RCA PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.260A	66X23	1N1763	40H	SR500	Silicon
M2	.260A	66X23	1N1763	40H	SR500	Silicon

SIGNAL DIODES

ITEM No.	OBIG. TYPE	REPLACEMENT DATA: BRADFORD PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M3	1N80 or CK706A			1N80 1N80	1N80 1N80	Video Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	BRADFORD PART No.	NOTES
M4	Tuner	25A1209	VHF with UHF Provisions, STANDARD COIL REPLACEMENT
	Tuner	25A1207	UHF #GGB-422L A
	Switch	2AS23	UHF Input
M5	Antenna	9A3479	JFD REPLACEMENT #TA409

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	17X306	
Knob	10AU18-2	Horiz. Hold
Knob	10AU14	Contrast
Knob	10AU15	Volume
Cabinet	34X621-8	

WIRING DATA

High Voltage Lead	Use BELDEN No. 8889
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8484 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

BRADFORD MODEL WGEC-8945B

FOLDER 1

TUNER PARTS LIST AND DESCRIPTIONS

25A1209

TUBES

• GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V201	RF Amplifier	2CY5	V202	Mixer - Osc.	5CG8

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	10		NPO-DI 10	DTZ-10	C10QIC	CCTO-100	CNO-410	10TCC-Q10
C202	5.6 10%							10TCC-V56
C203	10		NPO-DI 10	DTZ-10	C10QIC	CCTO-100	CNO-410	CNO-410
C204	1.0 10%		NPO-DI 1.0	TCZ-1			CNO-510	10TCC-V10
C205	1000		EF-001	MFT-1000		CCF-102	CT280A	
C206								
C207	100		EF-0001	MFT-100		CCF-102	CT280A	
C208	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C209								
C210	10		NPO-DI 10	DTZ-10	C10QIC	CCTO-100	CNO-410	10TCC-Q10
C211	30							
C212	1000		EF-001	MFT-1000		CCF-102	CT280A	
C213	10		NPO-DI 10	DTZ-10	C10QIC	CCTO-100	CNO-410	10TCC-Q10
C214	10		NPO-DI 10	DTZ-10	C10QIC	CCTO-100	CNO-410	10TCC-Q10
C215	1000		EF-001	MFT-1000		CCF-102	CT280A	
C216	1000		EF-001	MFT-1000		CCF-102	CT280A	
C217	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C218	1000		EF-001	MFT-1000		CCF-102	CT280A	
C219	1000		EF-001	MFT-1000		CCF-102	CT280A	

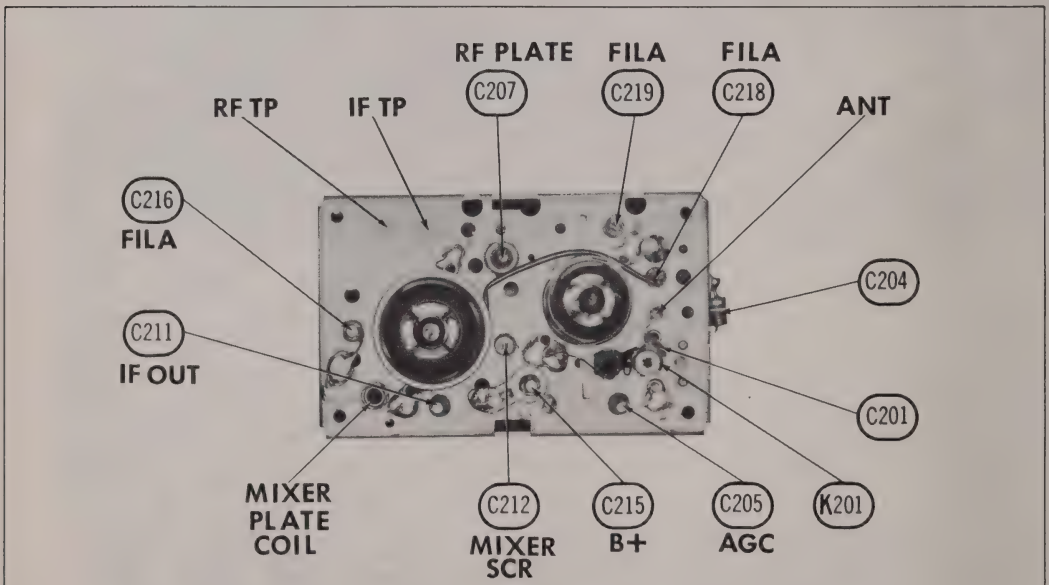
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

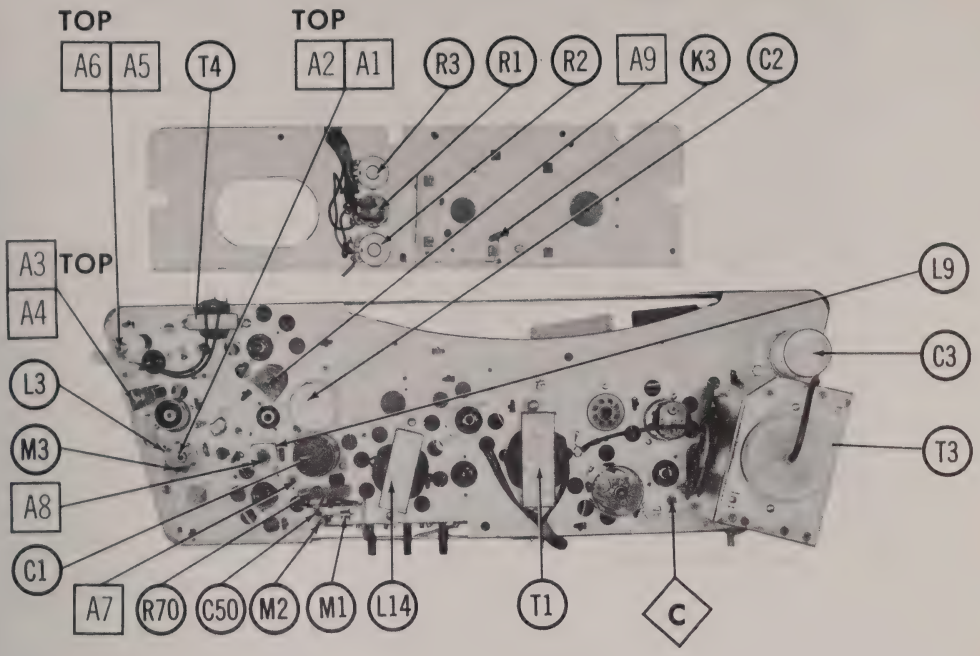
ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R201	10K				R206	2200Ω			
R202	10K				R207	10K			
R203	22K				R208	10K			
R204	22K				R209	15K			
R205	220K				R210	47K			

COMPONENT COMBINATIONS

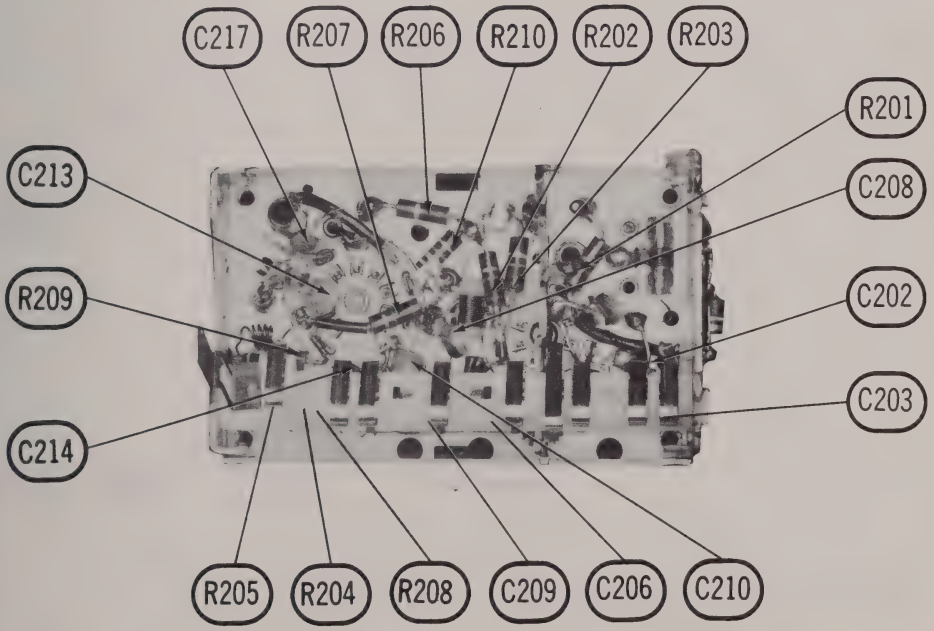
ITEM No.	USE	DESCRIPTION	PART No.	REPLACEMENT DATA
K201	Antenna Filter			



VHF TUNER WITH UHF PROVISIONS 25A1209 —TOP VIEW



CHASSIS - TOP VIEW



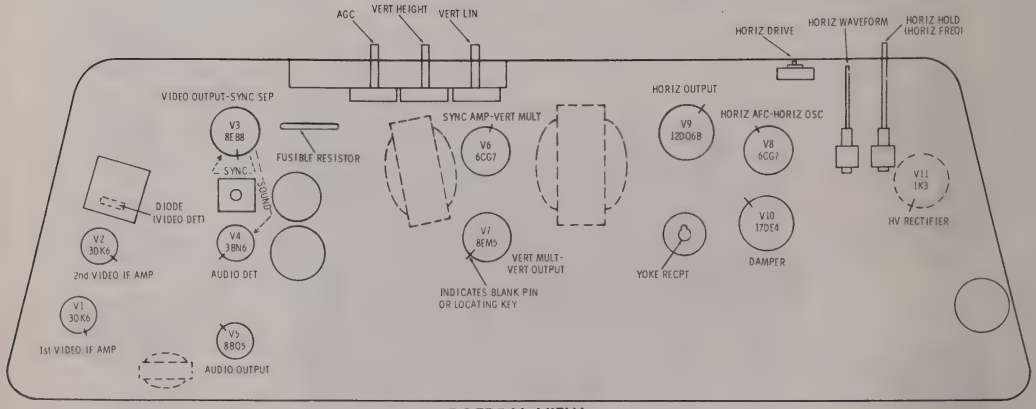
VHF TUNER with UHF Provisions 25A1209 - BOTTOM VIEW

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3DK6	1meg	56Ω	23Ω	22Ω	†3000Ω	†3000Ω	0Ω		
V2	3DK6	.1Ω	150Ω	22Ω	21Ω	†3000Ω	†3000Ω	0Ω		
V3	8EB8	0Ω	2.2meg	†220K	35Ω	28Ω	•200Ω	800K	†2500Ω	†3600Ω
V4	3BN6	•400Ω	5.5Ω	21Ω	20Ω	†7200Ω	5.5Ω	†330K		
V5	8BQ5	NC	•100Ω	150Ω	28Ω	23Ω	NC	†750Ω	NC	†370Ω
V6	6CG7	•+1.1meg	•600K	0Ω	37Ω	35Ω	†12K	47K	0Ω	0Ω
V7	8EM5	†40Ω	NC	330K	37Ω	45Ω	NC	470Ω	NC	†455Ω
V8	6CG7	†56K	410K	0Ω	10Ω	12Ω	†40Ω	1.5meg	410K	0Ω
V9	12DQ6B	TP	20Ω	TP	†22K	1meg	TP	14Ω	0Ω	TOP CAP +16Ω
V10	17DE4	TP	NC	†33K	NC	†40Ω	TP	3Ω	10Ω	
V11	1K3	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP +315Ω
V12	19XP4	12Ω	180K	+10meg	†100K	NC	NC	•300K	14Ω	
V201	2CY5	•1.5meg	0Ω	3Ω	2Ω	†2500Ω	†12K	0Ω		
V202	5CG8	15K	†12K	0Ω	0Ω	2Ω	†5000Ω	†20K	0Ω	240K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

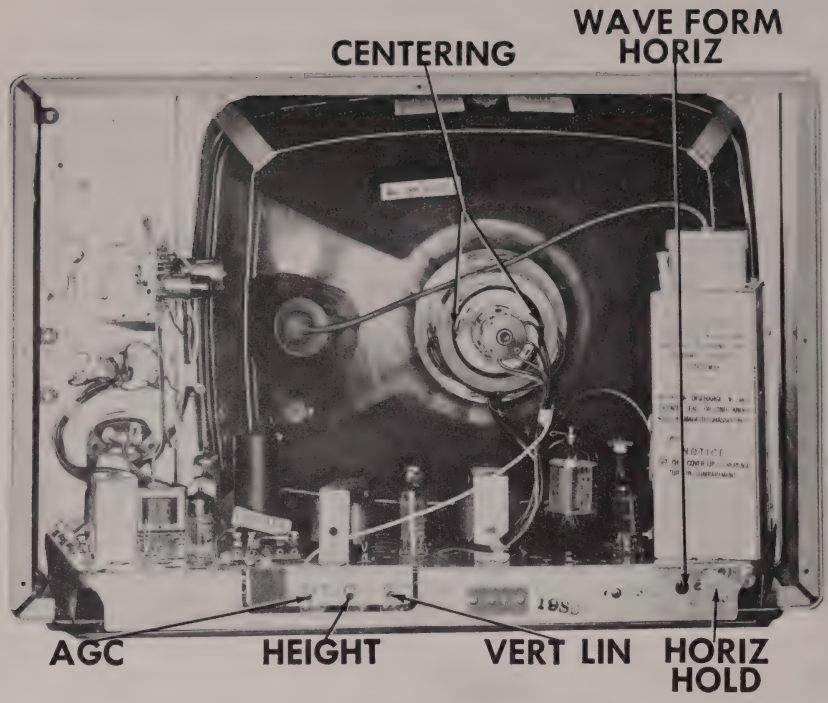
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM OUTPUT OF M1.
+ MEASURED FROM PIN 3 OF V10.

NC NO CONNECTION.
TP TIE POINT



BOTTOM VIEW

TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Suggested Alignment Tools:

B1 ..... 1/4" Nut Driver

B2 ..... GENERAL CEMENT #8271, 8279
WALSCO #2524, 2527

Tune in a station and adjust the Horizontal Hold until the picture is just about to tear out of sync as can be seen at the top of the picture.

Turn the Contrast fully counterclockwise and the Brightness clockwise so that the picture appears washed out. Turn the Horizontal Drive trimmer (B1) clockwise until white vertical bars (drive lines) appear in the left center portion of the raster, then counterclockwise until the white bars just disappear.

Connect the vertical amplifier of a scope to point Ⓒ. Low side to chassis. Adjust the Horizontal Waveform slug (B2) until the round and sharp peaks of the waveform are equal in amplitude. See Fig. 4. Keep the picture in sync during this adjustment.

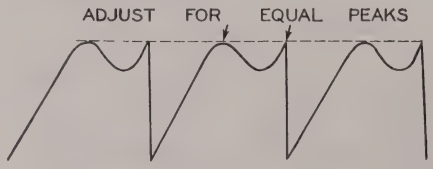


FIG. 4

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 8 metal screws holding rear cover.
2. Remove rear cover.
3. Remove 6 push-on type knobs (7 if UHF equipped) in front.
4. Remove picture tube socket, yoke plug, speaker leads, and high voltage lead.
5. Remove 5 screws holding control panel.
6. Remove 4 chassis bolts.
7. Remove chassis.

PICTURE TUBE REMOVAL

It is necessary to remove the chassis for picture tube removal.

PHOTOFACT® Folder with CIRCUITRACE®

ZENITH CHASSIS 16F25, T, TU, Q, U, 16F26, Q, U

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

ZENITH CHASSIS 16F25, T, TU, Q, U, 16F26, Q, U

MODEL F2215L (TV CH. 16F25Q, REMOTE CONTROL S-48583)

ZENITH CHASSIS 16F25, T, TU, Q, U, 16F26, Q, U

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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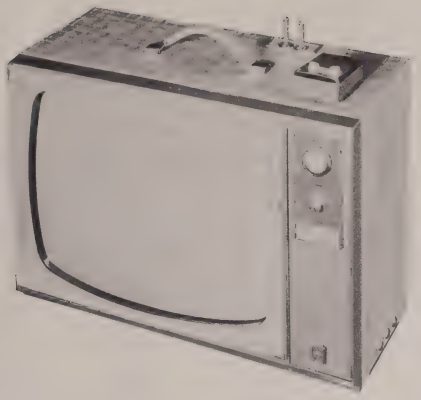
SET 523 FOLDER 2

PHOTOFACT® Folder with CIRCUITRACE®

ZENITH CHASSIS 16F25, T, TU, Q, U, 16F26, Q, U

ZENITH CHASSIS 16F25, T, TU, Q, U, 16F26, Q, U



MODEL F2215L (TV CH. 16F25Q, REMOTE CONTROL S-48583)

TRADE NAME ZENITH

MODELS	TV Chassis
F1805C, F1805L, F1806B, F1806L, F1807C, F1807L	16F25 or 16F26
F1805CU, F1805LU, F1806BU, F1806LU, F1807CU, F1807LU	16F25U or 16F26U
F2010C	16F25Q or 16F26Q
F2105C, F2110B, F2111L, F2120E, F2120M, F2120R, F2120W	16F25
F2105CU, F2110BU, F2111U, F2120EU, F2120MU, F2120RU, F2120WU	16F25U
F2112J, F2112W	16F25T
F2112JU, F2112WU	16F25TU
F2214L, F2230E, F2230M, F2230R, F2230W, F2215J, F2215L	16F25Q

MANUFACTURER	Zenith Radio Corp., 6001 Dickens Avenue, Chicago 39, Illinois
TYPE SET	Television Receiver (16F25Q, 16F26Q Chassis with Remote Control Receiver S-48583)
TUBES	TV: VHF - Sixteen, UHF - Seventeen Remote Control Receiver - Six
POWER SUPPLY	110-120 Volts AC, 60 Cycle AC
RATING	TV (VHF) & Remote: 225 Watts, 2 Amp. @ 117 Volts AC (255 Watts, 2.4 Amp. While Tuning)
	TV Only: 190 Watts, 1.7 Amp. @ 117 Volts
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Pry out mask from bottom and remove mask. Remove 4 screws (now visible) holding safety glass.

FUSE

TV: A 7/10 Amp. fuse is used for low voltage power supply protection. (For location, see "Tube Placement Chart".)

A fuse wire is used for filament protection. (For location, see M2 in photo "Chassis - Bottom View".)

Remote Control Receiver: A 3/4 Amp. fuse is used for receiver protection. (See M11, "Chassis-Top View").

TUNER OSCILLATOR ADJUSTMENT

Oscillator adjustment screws are adjustable from the front of the cabinet.

AGC

The AGC may be varied by means of an AGC Control. (For location, see "Tube Placement Chart".)

FOCUS

The focus may be varied by means of a Focus Control. (For location, see "Tube Placement Chart".)

SYNC STABILITY

Sync stability may be varied by means of a Fringe Lock. (For location, see "Tube Placement Chart".)

HORIZONTAL OSCILLATOR ADJUSTMENT

The Horizontal Frequency Slug is used for the Horizontal Hold. (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by adjusting a metallic sleeve, located between the yoke and the picture tube neck, in or out of the yoke.

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Buzz Control for MINIMUM buzz and maximum sound. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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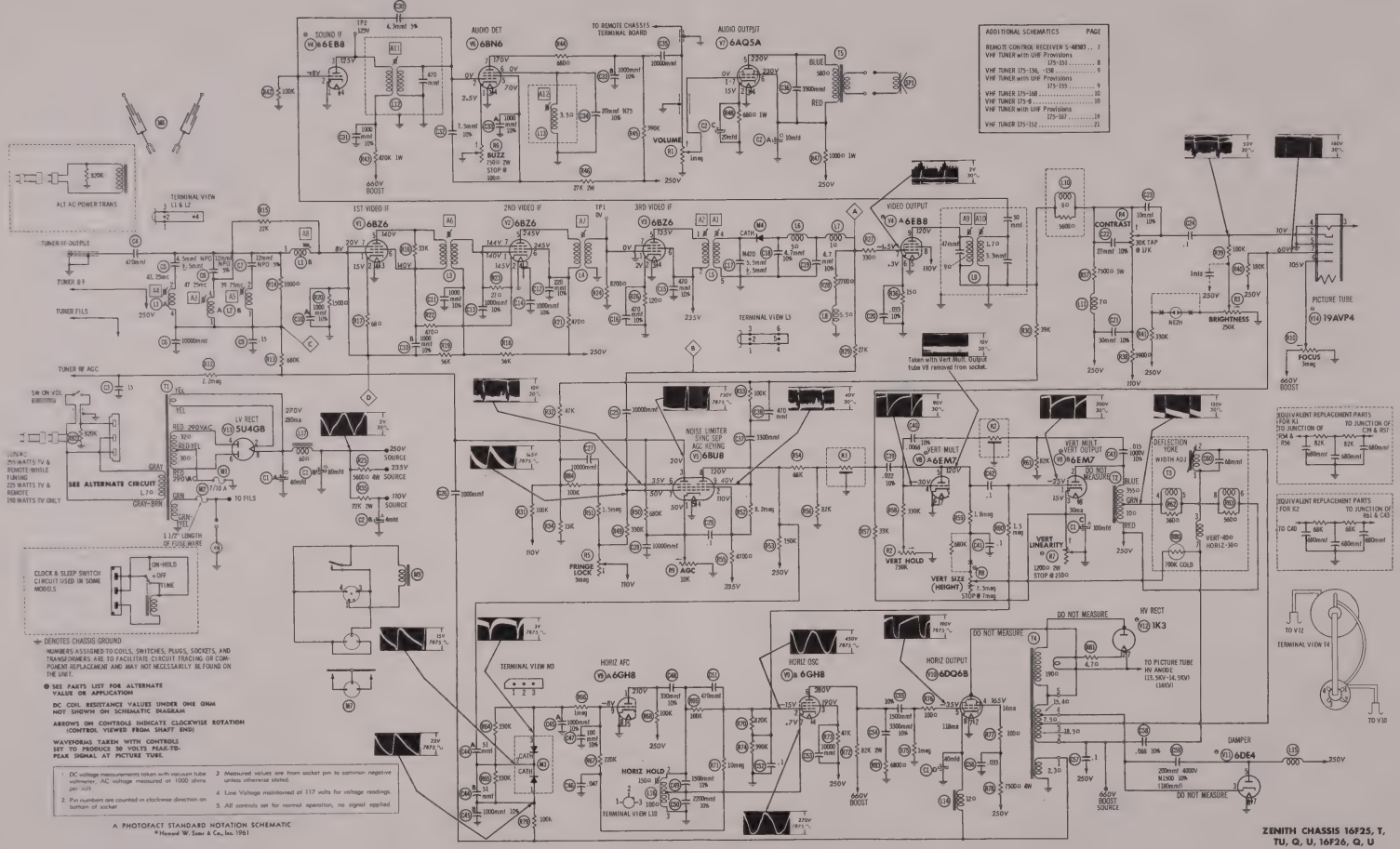
KA498

SET 523 FOLDER 2


ADDITIONAL SCHEMATICS PAGE
REMOTE CONTROL RECEIVER S-48583 .. 7
VHF TUNER with UHF Provisions 175-151 .. 8
VHF TUNER 175-156, -158 .. 9
VHF TUNER with UHF Provisions 175-155 .. 9
VHF TUNER 175-168 .. 10
VHF TUNER 175-8 .. 10
VHF TUNER with UHF Provisions 175-167 .. 19
VHF TUNER 175-152 .. 21
SOUND IF
AUDIO DET
AUDIO OUTPUT
TO REMOTE CHASSIS TERMINAL BOARD
VOLUME
BUZZ
BOOST
ALT AC POWER TRANS
TERMINAL VIEW
TUNER IF OUTPUT
TUNER B+
TUNER FILS
1ST VIDEO IF
2ND VIDEO IF
3RD VIDEO IF
VIDEO OUTPUT
CONTRAST
BRIGHTNESS
PICTURE TUBE
FOCUS
TUNER RF AGC
S-W ON VOL
SEE ALTERNATE CIRCUIT
TO FILS
CLOCK & SLEEP SWITCH CIRCUIT USED IN SOME MODELS
NOISE LIMITER SYNC SEP AGC KEYING
VERT MULT
VERT MULT OUTPUT
DEFLECTION YOKE
VERT LINEARITY
VERT HOLD
VERT SIZE (HEIGHT)
HORIZ AFC
HORIZ OSC
HORIZ OUTPUT
HORIZ HOLD
HV RECT
DAMPER
DO NOT MEASURE
TO PICTURE TUBE HV ANODE (13, 14KV-14, 9KV) (.14KV)
TERMINAL VIEW T4
TERMINAL VIEW M3
TERMINAL VIEW L10
TERMINAL VIEW L3
DENOTES CHASSIS GROUND
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 30 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.
1. DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation, no signal applied.
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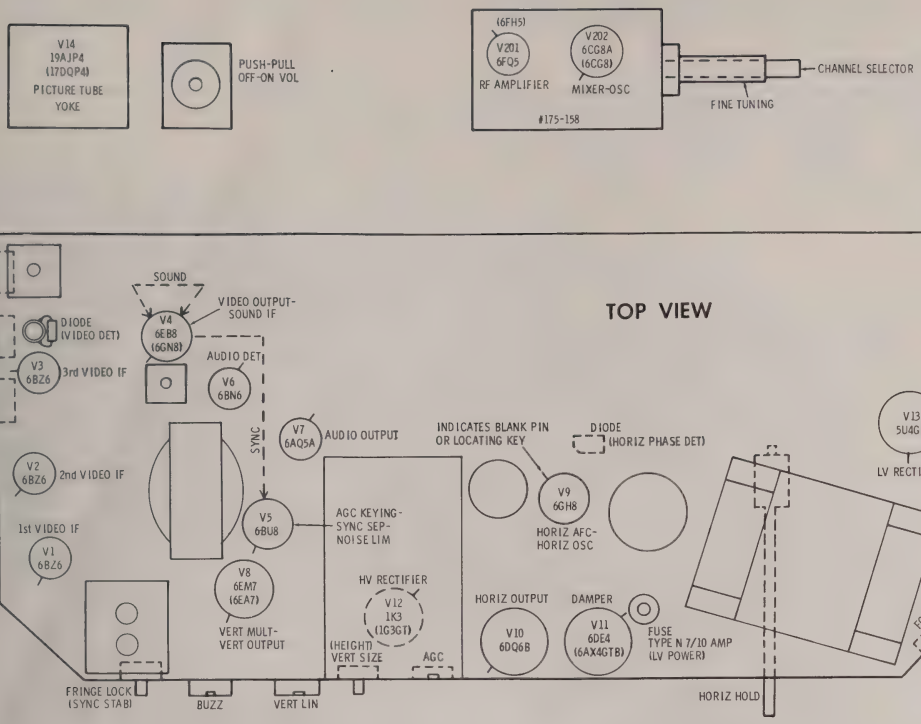
ZENITH CHASSIS 16F25, T, TU, Q, U, 16F26, Q, U

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound Fuse (LV Power), Fuse Wire (Fil.), V13

SWEEP FAILURE
No raster, has sound V9, V10, V11, V12, V14
No vertical deflection V8
Poor vert. linearity or foldover V8
Poor horiz. linearity or foldover V9, V10, V11
Narrow picture V9, V10, V11, V13
Vert. off freq. V8
Horiz. off freq. Diodes (Horiz. Phase Det.), V9

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (Video Det.), V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V14
Has pic, no sound V4, V6, V7
Overloaded picture V5

SYNC FAILURE
No vert. sync V5
No horiz. sync V5
No vert. or horiz. sync V5

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	470mmf	High side to TP-1. Low side to chassis.	44.0MC (10MC Swp)	39.75MC 41.25MC 45.75MC	Between two channels	Vert. Amp. thru 10K to point Ⓐ. Low side to chassis. (Across Video Det. load)	A1, A2	Set sweep output to produce 3 volts peak to peak on scope. Adjust A1 and A2 alternately for maximum gain and symmetry with the 45.75MC marker positioned as shown in Fig. 1. The 39.75MC marker can fall within ±.5MC of the specified frequency. If the desired response cannot be obtained, see that the cores are entering their respective windings from opposite ends.
2.	Direct	High side to ungrounded tube shield floating over Mixer-Osc. (V202). Low side to chassis.	"	39.75MC 41.25MC 47.25MC	"	"	A3, A4, A5	Connect a clip lead from point Ⓑ to chassis. Connect a clip lead from point Ⓒ to point Ⓓ. Use high scope gain and adjust A3 thru A5 for MINIMUM amplitudes at markers as shown in Fig. 2. A3 controls 39.75MC, A4 controls 41.25MC and A5 controls 47.25MC.
3.	"	"	"	41.25MC 42.75MC 45.0MC 45.75MC	"	"	A6, A7, A8, & Mixer Plate Coil	Disconnect the clip lead from point Ⓓ and connect to chassis. Adjust for maximum gain and symmetry of response similar to Fig. 3 with markers as shown. A6 affects the low frequency side and A7 affects the high frequency side.

SOUND IF ALIGNMENT

Connect an adjustable attenuator between the antenna and the receiver terminals.
Tune in a TV station and adjust the attenuator until the signal is below the limiting level of the Audio Detector as evidenced by a hiss similar to super-regeneration in the sound. Adjust A9, A10, A11 and A12 for maximum sound and best quality. Adjust the Buzz control for MINIMUM buzz. If the hiss disappears during alignment, further reduce the signal until the hiss returns.

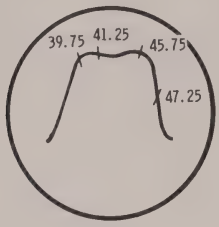


FIG.1

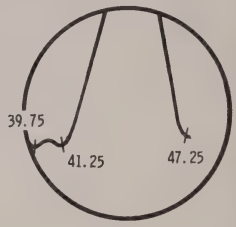


FIG.2

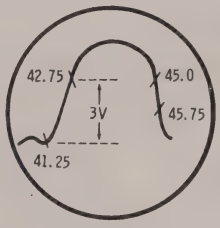
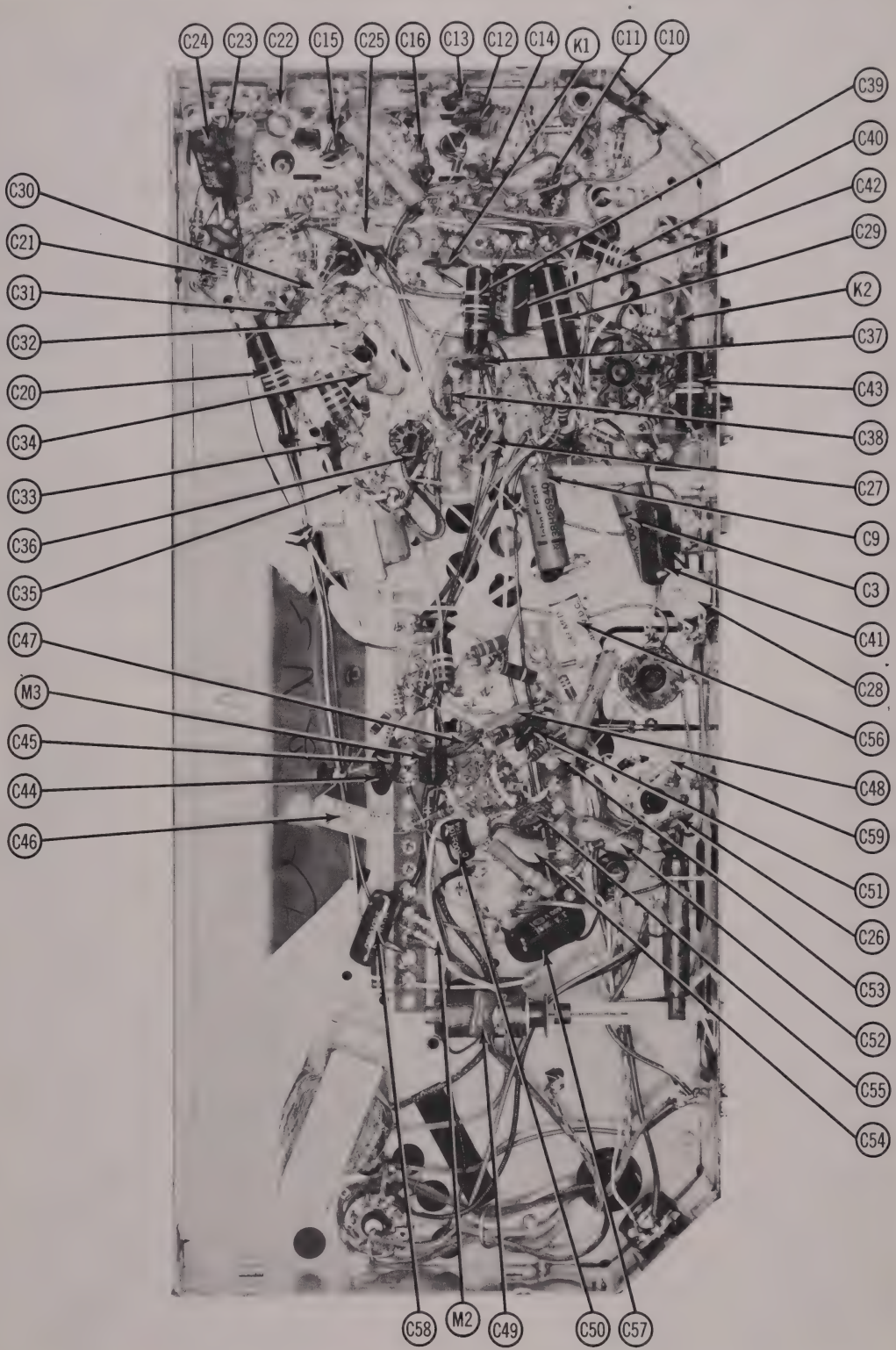


FIG.3

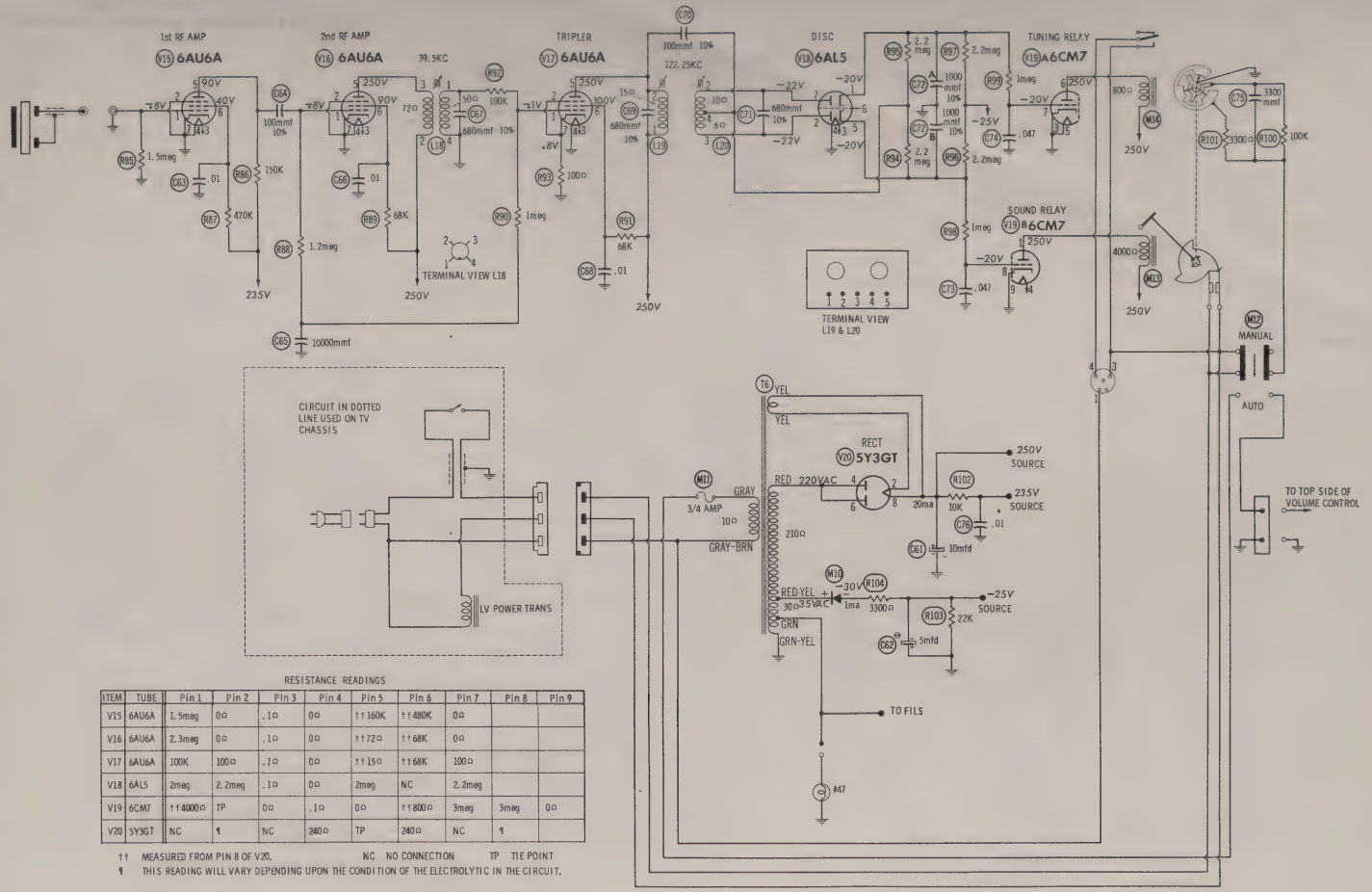
TV CHASSIS BOTTOM VIEW - RESISTOR & INDUCTOR IDENT.



TV CHASSIS BOTTOM VIEW - CAPACITOR & MISC. IDENT.

ZENITH CHASSIS 16F25,
T, TU, Q, U, 16F26, Q, U

FOLDER 2



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V15	6AU6A	1.5meg	0Ω	.1Ω	0Ω	††160K	††480K	0Ω		
V16	6AU6A	2.3meg	0Ω	.1Ω	0Ω	††72Ω	††68K	0Ω		
V17	6AU6A	100K	100Ω	.1Ω	0Ω	††15Ω	††68K	100Ω		
V18	6AL5	2meg	2.2meg	.1Ω	0Ω	2meg	NC	2.2meg		
V19	6CM7	††4000Ω	TP	0Ω	.1Ω	0Ω	††800Ω	3meg	3meg	0Ω
V20	5Y3GT	NC	¶	NC	240Ω	TP	240Ω	NC	¶	

†† MEASURED FROM PIN 8 OF V20. NC NO CONNECTION TP TIE POINT
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.

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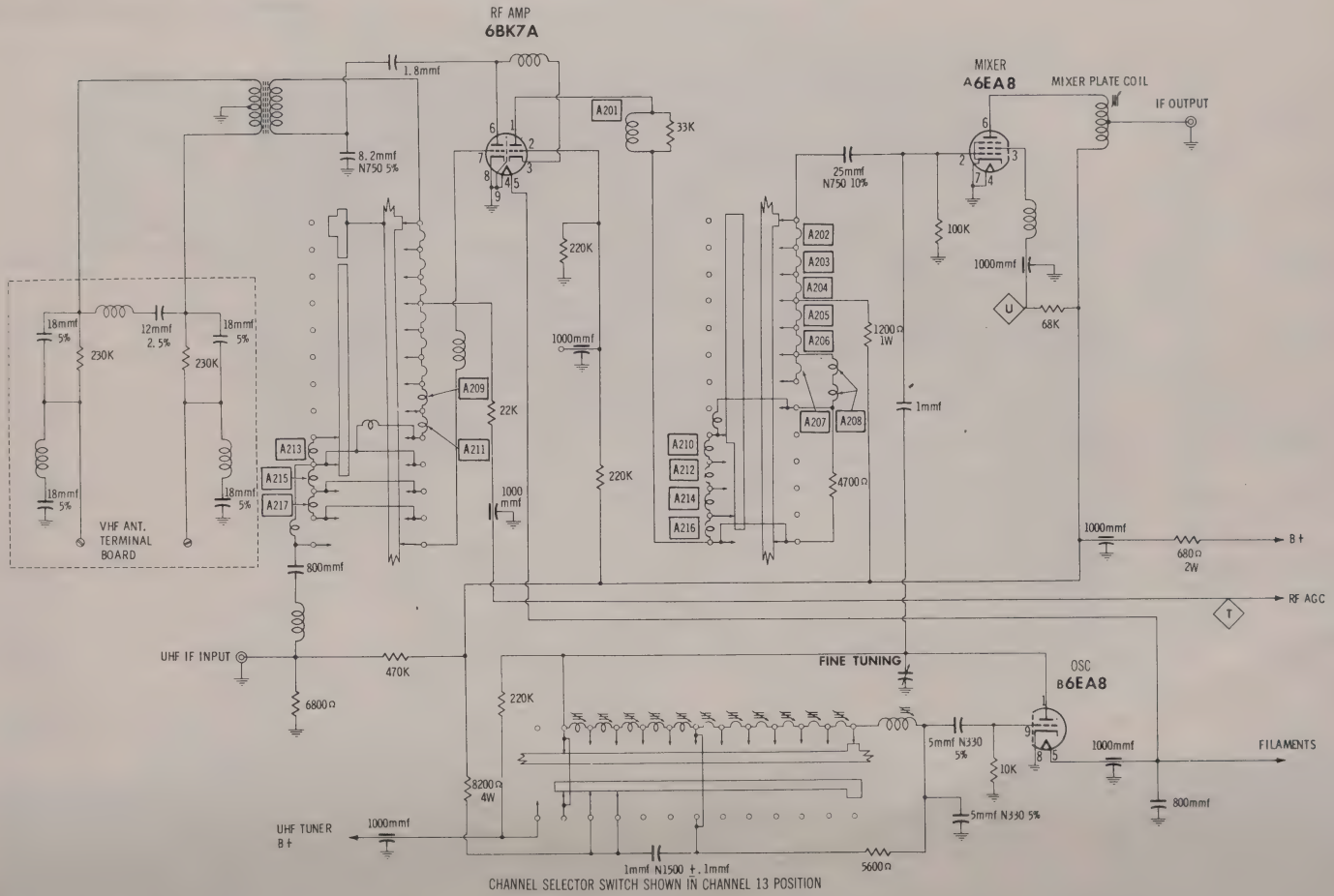
REMOTE CONTROL RECEIVER S-48583

ZENITH CHASSIS 16F25,
T, TU, Q, U, 16F26, Q, U



CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION

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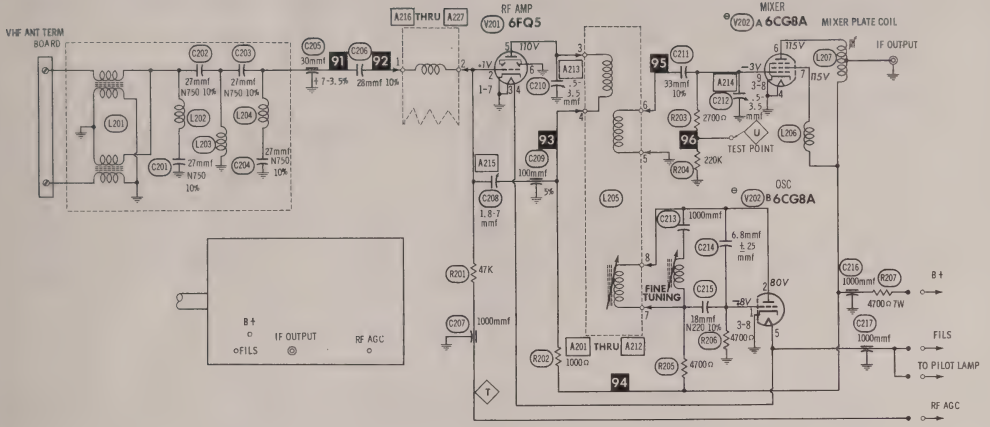
VHF TUNER with UHF Provisions 175-151



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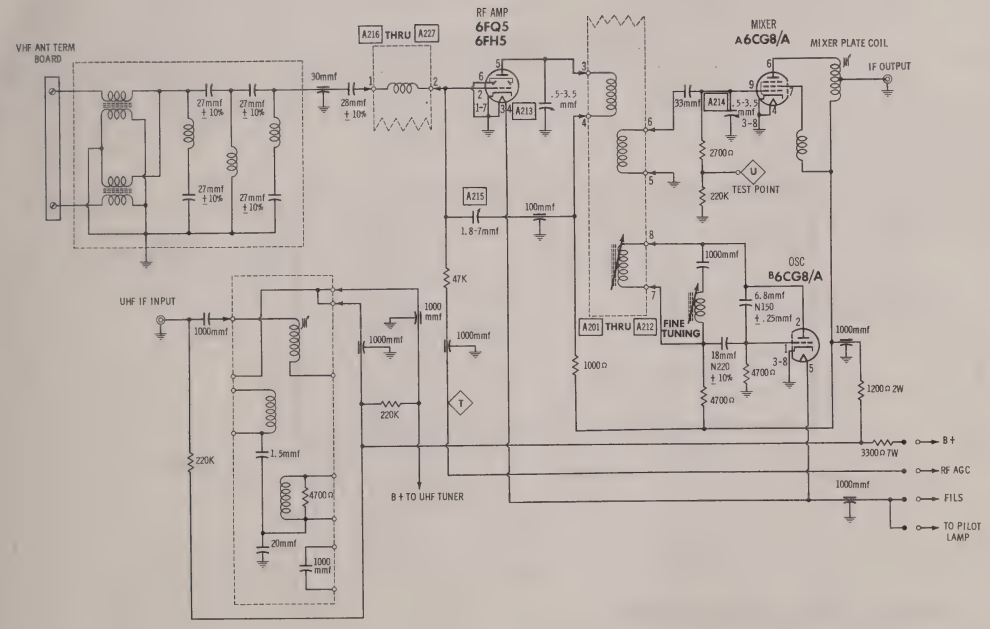
VHF TUNER 175-156, 175-158



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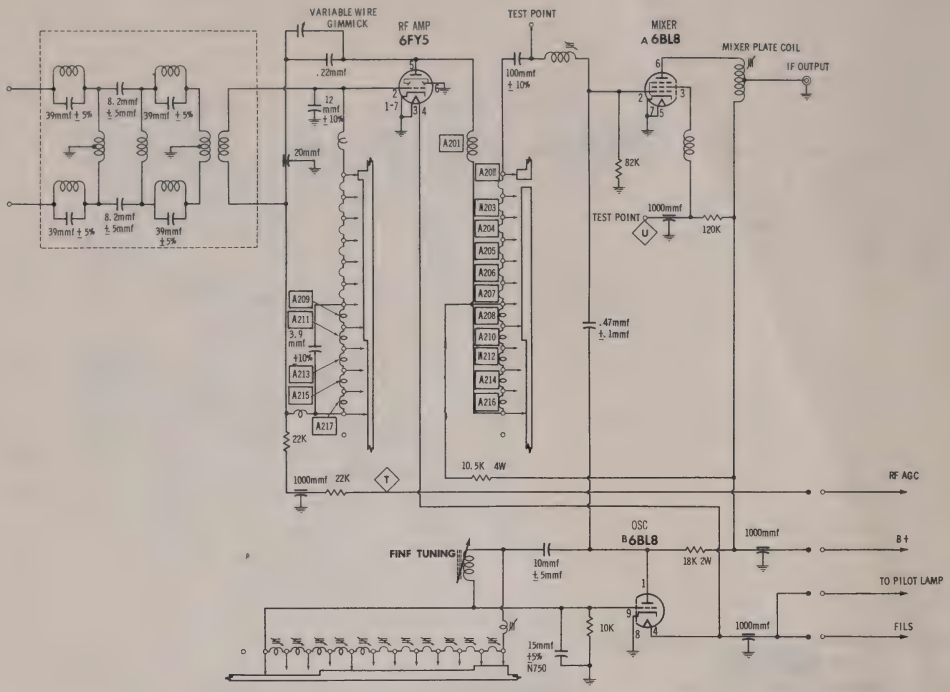
VHF TUNER with UHF Provisions 175-155



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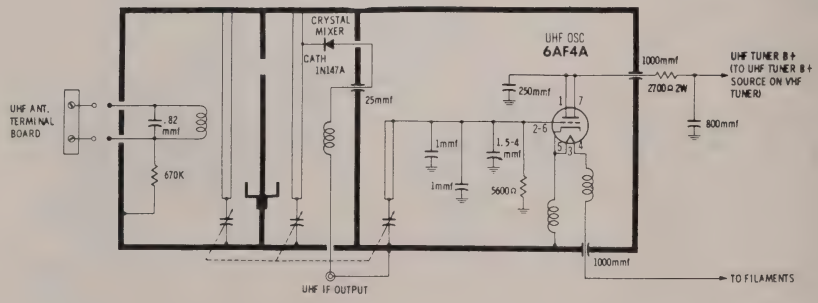
VHF TUNER 175-158



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UHF TUNER 175-8

VHF TUNER ALIGNMENT INSTRUCTIONS

175-155, 156, 158

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: A201 thru A212 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987
WALSCO #2531
A213, A214, A215..... GENERAL CEMENT #5000, 5003, 8276, 8290
WALSCO #2512, 2525

VHF OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Set the Fine Tuning to the center of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across Video Det. load.	A201	Adjust to place sound marker in trap notch as in Fig. 201. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A202	
			201MC	199.25MC 203.75MC	11		A203	
			195MC	193.25MC 197.75MC	10		A204	
			189MC	187.25MC 191.75MC	9		A205	
			183MC	181.25MC 185.75MC	8		A206	
			177MC	175.25MC 179.75MC	7		A207	
			85MC	83.25MC 87.75MC	6		A208	
			79MC	77.25MC 81.75MC	5		A209	
			69MC	67.25MC 71.75MC	4		A210	
			63MC	61.25MC 65.75MC	3		A211	
			57MC	55.25MC 59.75MC	2		A212	

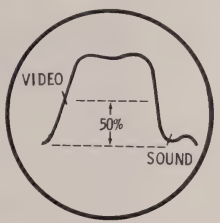


FIG. 201

VHF RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Connect the negative lead of a 4.5 volt bias supply to point (T). Positive to chassis.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC	193.25MC 197.75MC	10	Vert. Amp. thru 10K to point (U). Low side to chassis.	A213, A214, A215	Adjust A213 and A214 for maximum amplitude and symmetry with markers as shown in Fig. 202. Increase bias for MINIMUM amplitude of response curve. Without changing the bias adjust A215 to obtain MINIMUM response on the scope. Restore bias.
3.	"	"	213MC	211.25MC 215.75MC	13	"	A216	Adjust for maximum amplitude of response similar to Fig. 202. Adjust by compressing or expanding coil turns.
			207MC	205.25MC 209.75MC	12		A217	
			201MC	199.25MC 203.75MC	11		A218	
			195MC	193.25MC 197.75MC	10		A219	
			189MC	187.25MC 191.75MC	9		A220	
			183MC	181.25MC 185.75MC	8		A221	
			177MC	175.25MC 179.75MC	7		A222	
			85MC	83.25MC 87.75MC	6		A223	
			79MC	77.25MC 81.75MC	5		A224	
			69MC	67.25MC 71.75MC	4		A225	
			63MC	61.25MC 65.75MC	3		A226	
			57MC	55.25MC 59.75MC	2		A227	

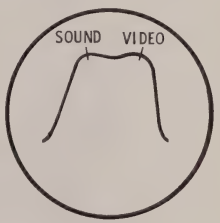


FIG. 202

VHF TUNER PARTS LIST AND DESCRIPTIONS

175, 158

TUBES

ITEM No.	USE	GENERAL ELECTRIC • RAYTHEON • SYLVANIA • TYPE
V201	RF Amplifier	6FQ5 (6FH5) *
V202	Mixer - Osc.	6CG8A (6CG8) *

* Alternate

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	27 N750 10%		N750-DI 25	TCN-27	C10Q27U	CCTN-270	CN7-427	10TCU-Q27
C202	27 N750 10%		N750-DI 25	TCN-27	C10Q27U	CCTN-270	CN7-427	10TCU-Q27
C203	27 N750 10%		N750-DI 25	TCN-27	C10Q27U	CCTN-270	CN7-427	10TCU-Q27
C204	27 N750 10%		N750-DI 25	TCN-27	C10Q27U	CCTN-270	CN7-427	10TCU-Q27
C205	30 +7-3.5%	#22-3111						
C206	28 10%		NPO-DI 25	TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C207	1000		EF-001	MFT-1000		CCF-102	CT280A	
C208	1.8-7	#22-3191		629-7				
C209	100 5%	#22-3192						
C210	.5-3.5	#22-3190						
C211	33 10%		NPO-DI 33	DTZ-33	C10Q33C	CCTO-330	CNO-433	10TCC-Q33
C212	.5-3.5	#22-3190						
C213	1000		BPD-001	DD-102	BYA10DI	CCD-102	B-210	5HK-D10
C214	6.8 ±.25mmf		NPO-DI 6.8	DTZ-6R8	C10V68C	CCTO-6R8	CNO-568	10TCC-V68
C215	18 N220 10%	#22-3025				*		10TCR-Q18
C216	1000		EF-001	MFT-1000		CCF-102	CT280A	
C217	1000		EF-001	MFT-1000		CCF-102	CT280A	

\# Zenith Part Number
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R201	47K			
R202	1000Ω			
R203	2700Ω			
R204	220K			

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R205	4700Ω			
R206	4700Ω			
R207	4700Ω 7W	PW7-4700Ω	7G-4700Ω	

COILS (RF-IF)

ITEM No.	USE	ZENITH PART No.	NOTES
L201	Ant. Trans.	S-47681	
L202	IF Trap	20-762	
L203	IF Trap	20-763	
L204	IF Trap	20-762	
L205A	Ant., RF, Mixer and Osc. Coils	174-22	Channel 2
B	"	174-23	Channel 3
C	"	174-24	Channel 4
D	"	174-25	Channel 5
E	"	174-26	Channel 6

ITEM No.	USE	ZENITH PART No.	NOTES
L205F	Ant., RF, Mixer, and Osc. Coils	174-27	Channel 7
G	"	174-28	Channel 8
H	"	174-29	Channel 9
J	"	174-30	Channel 10
K	"	174-31	Channel 11
L	"	174-32	Channel 12
M	"	174-33	Channel 13
L206	RF Choke	20-758	
L207	Mixer Plate Coil	S-47370	

TV PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	1st Video IF Amp.	6BZ6	V7	Audio Output	6AQ5A
V2	2nd Video IF Amp.	6BZ6	V8	Vert. Mult. - Vert. Output	6EM7 (6EA7) *
V3	3rd Video IF Amp.	6BZ6	V9	Horiz. AFC - Horiz. Osc.	6GH8
V4	Video Output - Sound IF	6EB8 (6GN8) *	V10	Horiz. Output	6DQ6B
V5	AGC Keying - Sync Sep. - Noise Limiter	6BU8	V11	Damper	6DE4 (6AX4GTB) *
V6	Audio Detector	6BN6	V12	HV Rectifier	1K3 (1G3GT) *
			V13	LV Rectifier	5U4GB

* Alternate

PICTURE TUBE

ITEM No.	REPLACEMENT DATA					NOTES
	ZENITH PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
V14	19AJP4 17DQP4		19AJP4 ①		19AJP4 ② 17DQP4 ②	① Aluminized ② Silver Screen "85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■40	400	22-3212	AFH4-100-40	┌D0478 └BR1005	FP454.8	TMQ-4346	TVL-4663.4	
B	▲80	400							
C	▲100	50							
D	40	25							
C2A	■10	400	22-2744	AFH3-180	C1445	FP368.68	TMT-3459	TVL-3655	
B	▲4	350							
C	20	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REMARKS	REPLACEMENT DATA					
					AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	.15	200V			P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C4	470				BPD-00047	DD-471	BYA10T47	CCD-471	B-347	10TS-T47
C5	4.5	NPO	±.5mmf		NPO-DI 4.7	DTZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C6	10000				BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	12	NPO	5%			TCZ-12	C10Q12C	CCTO-120	CNO-412	10TCC-Q12
C8	12	NPO	5%			TCZ-12	C10Q12C	CCTO-120	CNO-412	10TCC-Q12
C9	.15	200V			P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C10A	1000		10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
B	1000		10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C11	1000		10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C12	220		10%		1469-00022	TCZ-220	22R5T22	CM-19B-221K	CNO-322	MS-322
C13	1000		10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C14	1000		10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C15	470		10%		1469-00047		5R5T47	CM-19B-471K	MCJ244	MS-347
C16	470		10%		DD-470	DD-471	5R5T47	CCD-471	GP347	10TS-T47
C17	5.5	N470	±.5mmf	#22-3221				*		
C18	4.7		10%		NPO-SI 4.7	TCZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C19	4.7		10%		NPO-SI 4.7	TCZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C20	.033	200V	10%		V84C2833-10%		PM6S33	4DP-2-333	GEM-1613	6TM-S33
C21	50		10%		NPO-SI 50	TCZ-50	L10Q50	CCD-500	GP450	10TS-Q50
C22	27		10%		NPO-SI 27	TCZ-27	L10Q27	CCD-270	GP427	10TS-Q27
C23	10		10%		NPO-SI 10	TCZ-10	L10Q1	CCD-100	GP410	10TS-Q10
C24	.1	400V			P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C25	10000				BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C26	1000				BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C27	10000				BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C28	10000				BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C29	.1	400V			P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C30	4.3		5%		NPO-SI 4.7	TCZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C31	1000		10%		DI-1000	DD-102	5R5D1	CCD-102	GP210	10TS-D10
C32	7.5		10%	#22-2742						
C33A	1000		10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
B	1000		10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C34	20	N75	10%	#22-3139				*		
C35	10000				BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C36	3300				BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C37	3300				BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C38	470				BPD-00047	DD-471	BYA10T47	CCD-471	B-347	10TS-T47
C39	.022	400V	10%		V84C4S22-10%		PM4S22	4DP-2-223	GEM-1612	4TM-S22
C40	.0068	200V	10%		V84C2D68-10%		PM6D68	6DP-1-682	GEM-16268	6TM-D68
C41	.1	600V			P688N-1	DF-104	CUB6P1	6DP-4-103	GEM-601	6TM-P10
C42	.1	400V			P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C43	.015	1000V	10%				DPMS10S15	16DP-4-153		10TM-S15
C44A	51				DI-50	DD-500	L10Q51	CCD-500	GP450	10TS-Q50
B	51				DI-50	DD-500	L10Q51	CCD-500	GP450	10TS-Q50
C45A	1000		10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
B	1000		10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C46	.047	200V			P288N-047	DD-502	CUB4S47	4DP-3-473	GEM-4147	2TM-S47
C47	100		10%		DI-100	DD-101	L10T1	CCD-101	GP310	10TS-T10
C48	330		10%		1469-00033		5R5T33	CM-19B-331K	MCB241	MS-333
C49	1500		10%		1464-0015		5R5D15	CM-19B-152K	MCB456	MS-215
C50	2200		10%		1464-0022		1R5D22	CM-19B-222K	MCJ459	MS-222
C51	470				1469-00047		5R5T47	CM-19B-471K	MCJ244	MS-347
C52	.1	200V			P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C53	10000				BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C54	3300		10%		DI-3300		PM6D33	CCD-332	JL-233	10TS-D33
C55	1500		10%		DI-1500	DD-152	PM6D15	CCD-152	GP215	10TS-D15
C56	.033	200V			P288N-033	DD-303	CUB6S33	4DP-2-333	GEM-4133	6TM-S33

TV PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C57	1 600V		P65BN-1	DF-104	CUBSP1	6DP-4-104	GEM-401	5TM-P10
C58	.068 600V 10%		V94C6365-10%		P68SB1	6DP-4-683	GEM-6168	5TM-S68
C59	200 4000V M1500 10%	† (180)						
C60	68 10%		DI-68	DD-680	CM68	CCD-680	GP668	10TS-Q68

Zenith Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

† Some versions may use 180mmf (Pt. #22-3588).

CONTROLS

ITEM No	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1meg	½	63-4681	APL-597	C47S-1meg-S	B1J-137 *	PP16L	Volume
B	Shaft			AK-33	RS-3/16	Not Req.	D6-37	
C	Switch			Not Req.	Not Req.	SK2 *	Not Req.	Push-Pull Off-On
R2A	750K	½	63-4491	AB-98	A47-750K-S	B1J-136	U54	Vert. Hold
B	Shaft			AK-33	RS-3/16	SK3	D6-37	
R3A	250K	½	63-4493	AB-50	A47-250K-S	B1J-130	U49	Brightness
B	Shaft			AK-33	RS-3/16	SK3	D6-37	
R4A	30K	½	63-4493				U7-41S	Contrast
	.1% Tap							
B	Shaft						D6-37	
R5	5meg	½	63-4958	TT-87	B47-5meg-S	HLC5	PTA56L	Fringe Lock (Sync Stab.)
R6	750Ω 100Ω Stop	2(WW)	63-4344	WH-751 †	39-800 †		FL-750 †	Buzz Control
R7	1200Ω 320Ω Stop	2(WW)	63-4715	WH-102 ■	39-1000 ■	113-1000 ■	FL-1K ■	Vert. Linearity
R7	1000Ω 180Ω Stop	2(WW)	63-4488 ①		39-1000 ■	113-1000 ■	FL-1K ■	Vert. Linearity
R8	7.5meg 7meg Stop	½	63-4647 ①	TT-90 ▲	B47-7.5meg-S	HLC8 ▲	SU-69 ▲	Vert. Size (Height)
R8	5meg	½	63-4660 ②	TT-87	B47-5meg-S	HLC5	PTA56L	Vert. Size (Height)
R8A	10K	½	63-4055	TT-14	B47-10K-S	B1J-118	TA14L	AGC
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R9	3meg	½	63-4455	TT-84	B47-3meg-S	HLC3	SU-59	Focus

Zenith Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

† Used in Models F1805C, L, and may be used in Models F1806B, L.
‡ Used in some versions.
▲ Use 470K Resistor in series with right hand terminal, viewed shaft end terminals down.
■ Use 180Ω series resistor.
† Use 100Ω series resistor.
* Factory assembled part #PPQ11-137 (SK8)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	WORKMAN TV PART No.	REMARKS
R12	2.2meg			
R23	680K			
R24	1000Ω			
R25	22K			
R26	33K			
R27	68Ω			
R28	56K			
R29	56K			
R30	1500Ω			
R31	4700			
R32	470Ω			
R33	270			
R34	8200Ω			
R35	5600Ω 4W	PW5-5600Ω	5G-5600Ω	#63-3685
R36	120Ω			
R37	330Ω			
R38	2700Ω			
R39	27K			
R40	39K			
R41	100K			
R42	47K			
R43	100K			
R44	150K			
R45	15K			
R46	22K 2W			
R47	150Ω			
R48	75000Ω 5W	PW5-7500Ω	5G-7500Ω	#63-4723
R38	3900Ω			
R39	100K			
R40	180K			
R41	330K			
R42	100K			
R43	470K 1W			
R44	680Ω			
R45	390K			
R46	27K 2W			
R47	1000Ω 1W			
R48	680Ω 1W			

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	WORKMAN TV PART No.	REMARKS
R49	330K			
R50	680K			
R51	1.5meg			
R52	8.2meg			
R53	150K			
R54	68K			
R55	4700Ω			
R56	82K			
R57	33K			
R58	330K			
R59	1.8meg			
R60	1.5meg			
R61	82K			
R62	560Ω			
R63	68Ω			
R64	330K			
R65	330K			
R66	1meg			
R67	220K			
R68	100K			
R69	100K			
R70	820K			
R71	10meg			
R72	82K 2W			
R73	47K			
R74	390K			
R75	1meg			
R76	100Ω			
R77	100Ω			
R78	7500Ω 4W	PW5-7500Ω	4G-7500Ω	#63-4055
R79	100K			
R80	700K (Cold)			#63-4725
R81	4.7Ω			
R82	820K			
R83	6800Ω			
R84	100K			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	NOTES
L1A	41.25MC Trap	S-48548					① Complete Assy. Part #S-47967
B	1st Video IF						
L3A	39.75MC Trap	S-48683					② Complete Assy. Part #S-48195
B	47.25MC Trap						
L3	2nd Video IF	S-50474	TV-130	6234	RTC-8555	T231	② Wound on 5600Ω Resistor
L4	3rd Video IF	S-48539	TV-130	6234	RTC-8555	T231	③ Complete Assy. Part #S-48196
L5	4th Video IF	S-47958 ①					*Parallel with 5600Ω Res.
L6	Peaking (90mh)	S-51879	TV-151	6177	RTC-8594	T304	
L7	RF Choke (56uh)	S-21888	BC-585	4610	RTC-8530	T259	
L8	Peaking (170uh)	S-43619	TV-154	6180	RTC-8597	T310	

COILS (RF-IF) (cont)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	NOTES
L9A	4.5MC Trap	S-42872 ②	TV-120	1483 1PT	RTC-9056	T253	
B	1st Sound IF						
L10	Peaking (170uh)	S-43818 ③	TV-154 *	6180 *	RTC-8597 *	T310 *	
L11	Peaking (250uh)	S-18031	TV-155	6181	RTC-8596	T315	
L12	2nd Sound IF	S-22347 ④					
L13	Quadrature	S-45229	TV-121	1480	RTC-8609	T251	
L14	RF Choke (32MH)	S-48193					
L15	RF Choke (10uh)	S-22777	BC-566	4612	RTC-8522	T260	

COILS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	Merit PART No.	Miller PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	Workman TV PART No.
L16	Horiz. Osc.	S-47150							

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	RATINGS: DC RES.	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: ZENITH PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
L17	.280A	80Ω	1.2 Hy.	95-1663	C-2896 ①	C-2343	28C44	C-28X	① Drill new mounting hole.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI	RATING: SEC. 1	RATING: SEC. 2	REPLACEMENT DATA: ZENITH PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	117V ① 1.7A	580VCT ② .280A DC	5V ③ 3A	95-1667				R-122A	
	SEC. 3	SEC. 4	SEC. 5						
	6.3V ④ 8A								

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	Merit PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	Vert. Output	95-1700	A-3854	VO-38 ①	VO-100 ②	26873	A-136X	
T3	Yoke (Horiz.15.4MH) (110°) (Vert. 40MH) Rear Cover and Centering Device Width Sleeve	95-1782						
		S-49800 *						
T4	Horiz. Output	S-48197					D-197	
	Alt. Yoke	95-1795						

* Part of T3. ① Drill new mounting hole(s). ② Cut and tape blanking lead.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: ZENITH PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	5400Ω	3-4Ω	95-1685	A-3026 ①	A-3877 ①	24S46 ①	S-6Z	① Drill new mounting hole(s).

SPEAKER

ITEM No.	TYPE: SIZE	TYPE: FIELD	TYPE: V. C. IMP.	REPLACEMENT DATA: ZENITH PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	49-887	4A07	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ZENITH PART No.	REPLACEMENT DATA
K1	Vert. Integrator		87-8	
K2	Vert. Feedback		87-7	

FUSES

ITEM No.	TYPE	RATING	ZENITH PART No.: FUSE	ZENITH PART No.: HOLDER	LITTELFUSE PART No.: FUSE	LITTELFUSE PART No.: HOLDER	BUSS PART No.: FUSE	BUSS PART No.: HOLDER
M1	N	7/10 250V 8/10	136-38	63-21	336.700 (N 7/10 250V 8/10)	346010	N 7/10	HN 1/2 to 3/4
M2	1 1/2"	length of #24 wire						

SIGNAL DIODES

ITEM No.	OBSO. TYPE	REPLACEMENT DATA: ZENITH PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M3		103-20 *	6GC1 *			*Dual Selenium, Common Cathode Type
M4		103-23 *		1N60 *	1N60 *	*Crystal Diode, Video Det. Part of Transformer Assembly #S-47967

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M5	Tuner	175-158	VHF, Used in Models F2125J, L, F2320E, M, R, W, F2241, F2010C, STANDARD COIL REPLACEMENT #GG-4230A
	Tuner	175-152	VHF, Models F1805C, L, F1806B, L
	Tuner	175-156	VHF, Models F1807C, F2110B, G, F2111, P, F2112J, W, F2120E, M, R & W
	Tuner	175-158	VHF, Model F2105C
	Tuner	175-151 *	VHF with UHF Provisions, Models F1805C, L, F1806B, L
	Tuner	175-155 *	VHF with UHF Provisions, Models F1807C, F2110B, G, F2111, P, F2112J, W, F2120E, M, R & W
	Tuner	175-157 *	VHF with UHF Provisions, Model F2105C
	Tuner	175-8 *	UHF, Models F1805C, L, F1806B, L, F1807C, F2105C, F2110B, G, F2111, P, F2112J, W, F2120E, M, R & W
M6	Antenna (Dipole)	S-46769	JFD REPLACEMENT #TA-373, Models F2125J, L, F2241, F2112J, JU, W, WU, F2111, LU, F2105B, BU, F2010C
	Antenna (Monopole)		JFD REPLACEMENT #TA-402, F1805C, CU, L, LU, F1806B, BU, L, LU, F1807C, CU, L, LU, F2105C, CU
M7	Switch	S-44016	Channel Selector (Power Tuning)
M8	Switch	S-41498	Motor Switch Assembly (Power Tuning)
M9	Motor	141-153	Power Tuning Drive

* "U" Models Only.

WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-In	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8486 (Round) - 8 Conductor

REMOTE CONTROL RECEIVER PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	• GENERAL ELECTRIC • USE	TYPE
V15	1st RF Amplifier	6AU6A
V16	2nd RF Amplifier	6AU6A
V17	Tripler	6AU6A
V18	Discriminator	6AL5

ITEM No.	• RAYTHEON • SYLVANIA • USE	TYPE
V19	Tuning Relay Control - Sound Relay Control	6CM7
V20	Rectifier	5Y3GT

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C81	10	350	22-3943	PRE620	BR1045	TC83	TD-10-450	TVA-1604	
C82	5	50	22-3208	PRE510	BR5-50	TC30	TD-5-50	TVA-1303	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C83	.01	400V		P488N-01	DS-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C84	100		10%	1469-0001	TCZ-100	22ST1	CM-19B-101K	MCB235	MS-310
C85	10000			BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C86	.01	400V		P488N-01	DS-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C87	680		10%	1469-00068		5HS7S6	CM-19B-681K	MCJ249	MS-368
C88	.01	400V		P488N-01	DS-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C89	680		10%	1469-00068		5HS7S6	CM-19B-681K	MCJ249	MS-368
C70	100		10%	1469-0001	TCZ-100	22ST1	CM-19B-101K	MCB235	MS-310
C71	680		10%	1469-00068		5HS7S6	CM-19B-681K	MCJ249	MS-368
C72A	1000		10%	DI-1000	DD-102	P16M1K	CCD-102	GP210	10TS-D10
B	1000		10%	DI-1000	DD-102	P16M1K	CCD-102	GP210	10TS-D10

ZENITH CHASSIS 16R25, T, TU, Q, U, 16R26, Q, U

FOLDER 2

REMOTE CONTROL RECEIVER
PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C73	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C74	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C75	3300		BPD-0033	DD-332	BYAI0D33	CCD-332	B-233	5HK-D33
C76	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		REMARKS
		IRC PART No.	WORKMAN TV PART No.	
R85	1.5meg			
R86	150K			
R87	470K			
R88	1.2meg			
R89	68K			
R90	1meg			
R91	68K			
R92	100K			
R93	100Ω			
R94	2.2meg			

ITEM No.	RATING	REPLACEMENT DATA		REMARKS
		IRC PART No.	WORKMAN TV PART No.	
R95	2.2meg			
R96	2.2meg			
R97	2.2meg			
R98	1meg			
R99	1meg			
R100	100K			
R101	3300Ω			
R102	10K			
R103	22K			
R104	3300Ω			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		ZENITH PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L18	39.5KC Coil	S-43725					
L19	Discriminator	S-24788					
L20	Discriminator	S-24789					

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1		ZENITH PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T6	117V @ .48A	220V @ .050A DC Tap @ 32V @ .001A Tap @ 6.3V @ 1.9A		95-1697					
	SEC. 2	SEC. 4	SEC. 5						
	5V @ 2A								

POWER RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	ZENITH PART No.	RCA PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M10	.001A	212-21		Model 10		Bias

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ZENITH PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M11	3AG	3/4A 250V S/B	136-41	83-1883	313.750 (3AG 250V S/B)	357001	MDL 3/4	4405

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M12	Switch	85-646	Auto-Manual (DPDT Slide Type)
M13	Relay	S-48660	Step Volume, Includes Switch
M14	Relay	195-5 or 195-6	Tuning
	Microphone	S-47486	And Cable Assembly, For 17" Metal Cabinet
	Microphone	S-56136	And Cable Assembly, For 19" Metal Cabinet
	Microphone	S-50924	And Cable Assembly, For 19" Wooden Consolettes

CABINET PARTS

(When Ordering Cabinet Parts, Specify Model, Chassis & Color)

ITEM	PART NO.	MODELS	F1805C	F1805CU	F1805L	F1805LU	F1806B	F1806BU	F1806L	F1806LU	F1807C	F1807CU	F2010C	F2105C	F2105CU	F2110B	F2110BU	F2110G	F2110GU	F2111L	F2111LU	F2111P	F2111PU	F2112J	F2112JU	F2112W	F2112WU	F2120E	F2120EU	F2120M	F2120MU	F2120R	F2120RU	F2120W	F2120WU	F2214L	F2215J	F2215L	F2290E	F2290M	F2290R	F2290W
Safety Glass	192-280		X	X	X	X	X	X	X	X	X	X	X																													
Safety Glass	192-293													X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Knob, VHF Channel Selector	46-2373		X	X							X	X																															
Knob, "	46-2374				X	X																																				
Knob, "	46-2341						X	X	X	X																																	
Knob, "	46-2344												X																														
Knob, "	46-2530													X	X	X	X	X	X									X	X	X	X	X	X	X								
Knob, "	46-2510																			X	X	X	X	X	X	X	X															
Knob, UHF Channel Selector	S-47079			X		X		X		X		X			X		X		X		X		X		X		X		X		X		X								
Knob, UHF Channel Indicator	S-43927			X		X		X		X		X			X		X		X		X		X		X		X		X		X		X								
Knob, Fine Tuning	S-49420		X	X	X	X	X	X	X	X	X	X	X																														
Knob, "	S-50096																																				X	X	X	X	X	X	X
Knob, "	S-51170													X	X																												
Knob, "	S-49930															X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
Knob, Volume Contrast	S-45716		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Knob, V. Hold, Brightness	S-50121		X	X							X	X																															
Knob, "	S-50122				X	X			X	X																																	
Knob, "	S 50641						X	X																																			
Knob, "	S-46665												X																														
Knob, '	S-51171													X	X																												
Knob, "	S-49990															X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Knob, Horiz. Hold	S-46215		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cabinet	14-3212		X																																							
Cabinet	14-3213			X																																						
Cabinet	14-3214				X																																					
Cabinet	14-3215					X																																				
Cabinet	14-3337						X																																			
Cabinet	14-3338							X																																		
Cabinet	14-3339								X																																	
Cabinet	14-3340									X																																
Cabinet	14-3262										X	X																														
Cabinet	14-3116												X																													
Cabinet	14-3202													X																												
Cabinet	14-3203														X																											
Cabinet	14-3178															X																										
Cabinet	14-3179																X																									
Cabinet	14-3171																	X																								
Cabinet	14-3172																		X																							
Cabinet	14-3173																			X																						
Cabinet	14-3174																				X																					
Cabinet	14-3180																					X																				
Cabinet	14-3181																						X																			
Cabinet	14-3199																							X																		
Cabinet	14-3200																								X																	
Cabinet	14-3175																									X																
Cabinet	14-3176																										X															
Cabinet	14-3382																											X														
Cabinet	14-3383																												X													
Cabinet	14-3384																													X												
Cabinet	14-3385																														X											
Cabinet	14-3380																															X										
Cabinet	14-3381																																X									
Cabinet	14-3378																																	X									X
Cabinet	14-3379																																		X								
Cabinet	14-3201																																			X							
Cabinet	14-3382																																					X				
Cabinet	14-3384																																							X		
Cabinet	14-3182																																				X					
Cabinet	14-3177																																					X				

ZENITH CHASSIS 16F25,
T, TU, Q, U, 16F26, Q, U

FOLDER 2

VHF TUNER ALIGNMENT INSTRUCTIONS

175-151, 152, 167, 168

PRE-ALIGNMENT INSTRUCTIONS

Allow a 20 minute warm-up period for the receiver and test equipment.

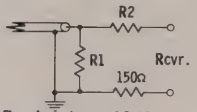
VHF OSCILLATOR ALIGNMENT

Set the Fine Tuning to the center of its range by turning the Fine Tuning shaft until the small index hole in the drive cam is directly over the small hole just below the channel 13 oscillator adjustment screw. Starting with the highest channel operating in the area, adjust the appropriate oscillator adjustment screw for best picture and sound for each channel available.

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2 volt bias supply to point Ⓣ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usuable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 201	Across antenna terminals thru matching network (Fig. 201).	213MC	211.25MC 215.75MC	13	Vert. amp. thru 10K to point Ⓣ. Low side to chassis.	A201	Adjust for maximum gain and symmetry of response similar to Fig. 202 with markers as shown.
2.	"	"	207MC	205.25MC 209.75MC	12	"	A202	"
3.	"	"	201MC	199.25MC 203.75MC	11	"	A203	"
4.	"	"	195MC	193.25MC 197.75MC	10	"	A204	"
5.	"	"	189MC	187.25MC 191.75MC	9	"	A205	"
6.	"	"	183MC	181.25MC 185.75MC	8	"	A206	"
7.	"	"	177MC	175.25MC 179.75MC	7	"	A207	"
8.	"	"	85MC	83.25MC 87.75MC	6	"	A208, A209	Adjust for maximum gain and symmetry of response similar to Fig. 202 with markers as shown. Adjust first coil for proper marker position and second coil for maximum gain and symmetry.
9.	"	"	79MC	77.25MC 81.75MC	5	"	A210, A211	"
10.	"	"	69MC	67.25MC 71.75MC	4	"	A212, A213	"
11.	"	"	63MC	61.25MC 65.75MC	3	"	A214, A215	"
12.	"	"	57MC	55.25MC 59.75MC	2	"	A216, A217	"

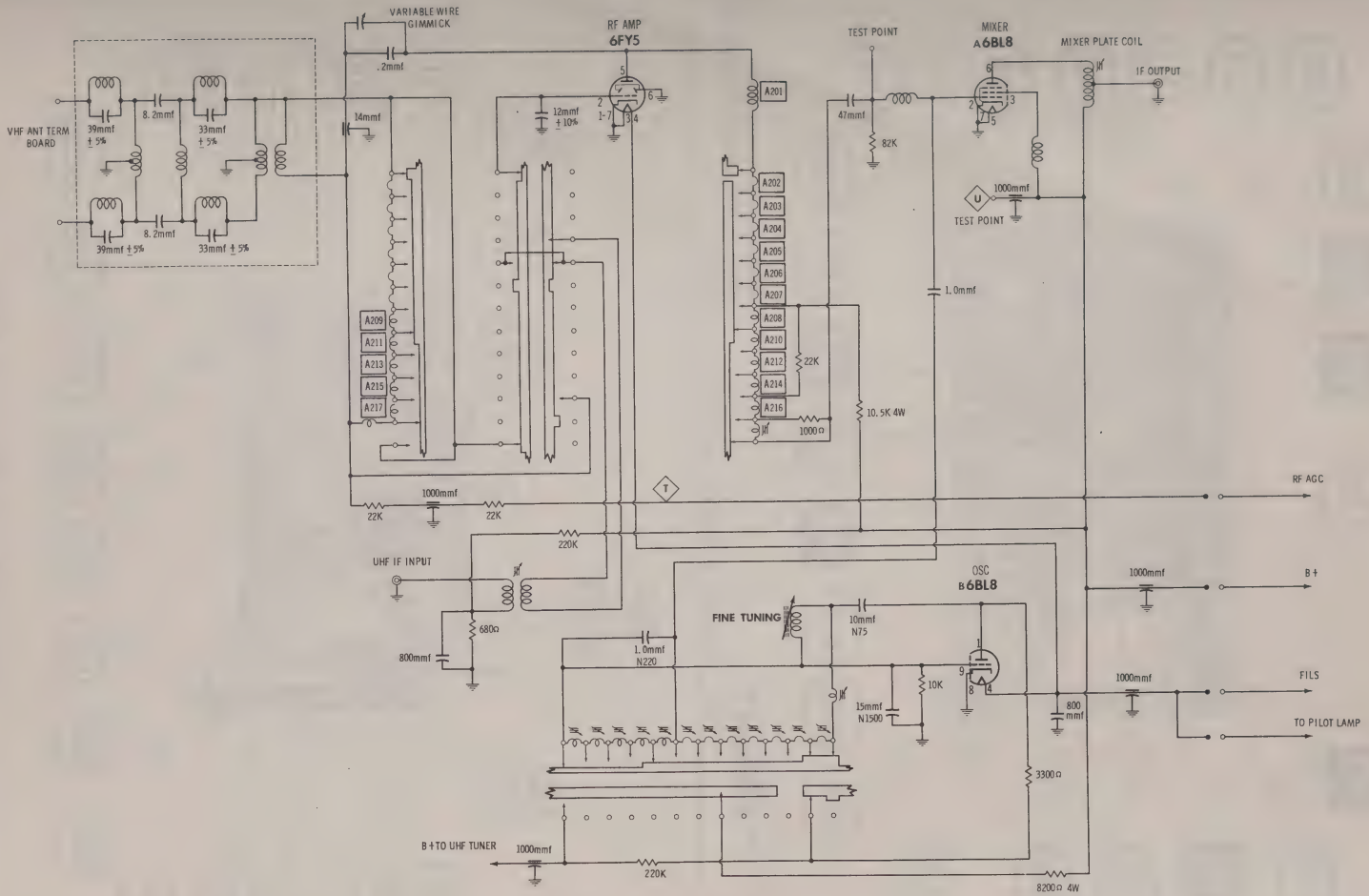


Zo = Impedance of Cable

Zo	R1	R2
50Ω	56Ω	120Ω
75Ω	82Ω	110Ω

FIG. 201

FIG. 202



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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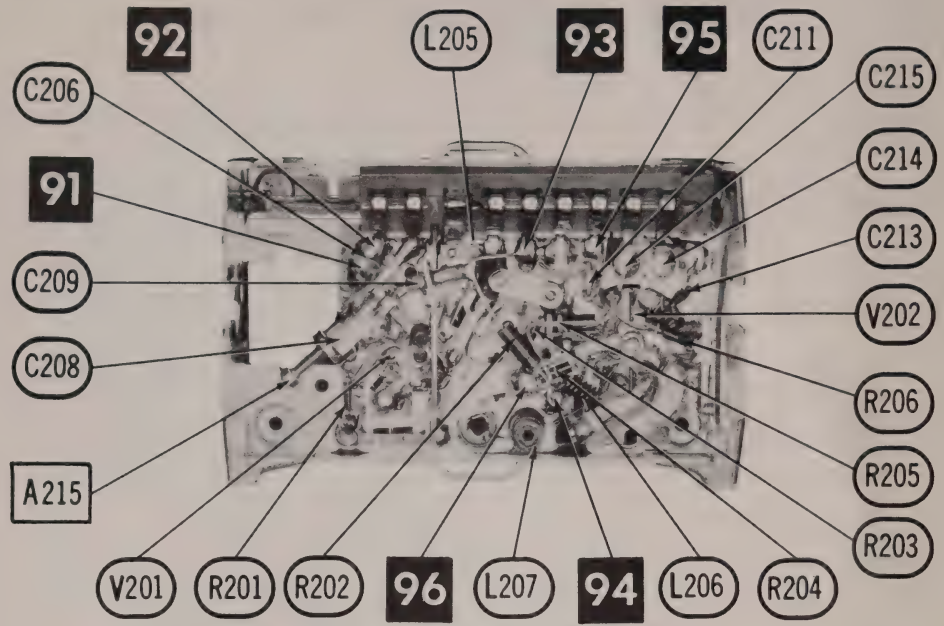
VHF TUNER with UHF Provisions-175-167

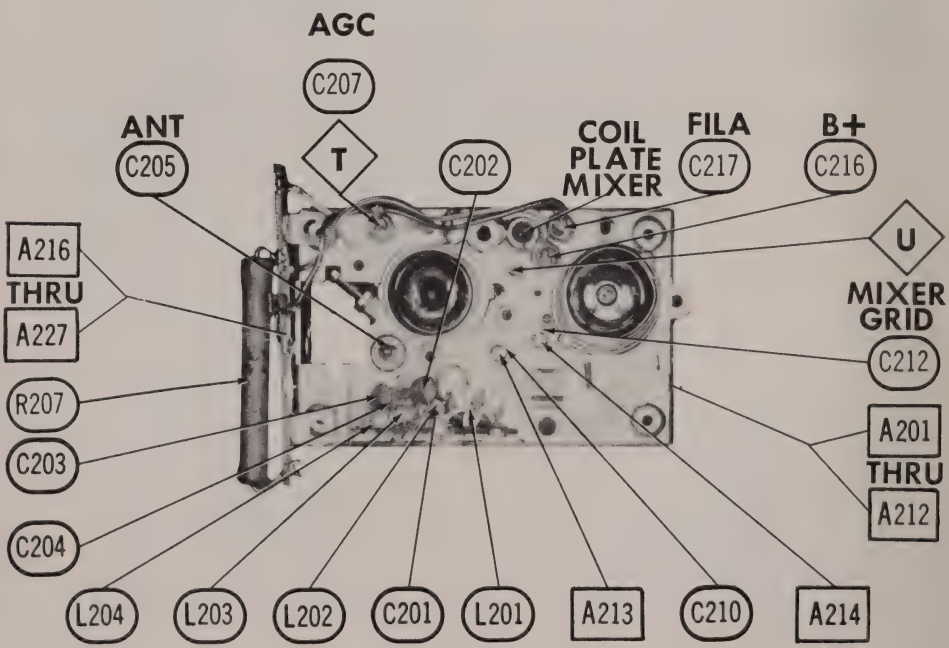
ZENITH CHASSIS 16F25, T, TU, Q, U, 16F26, Q, U



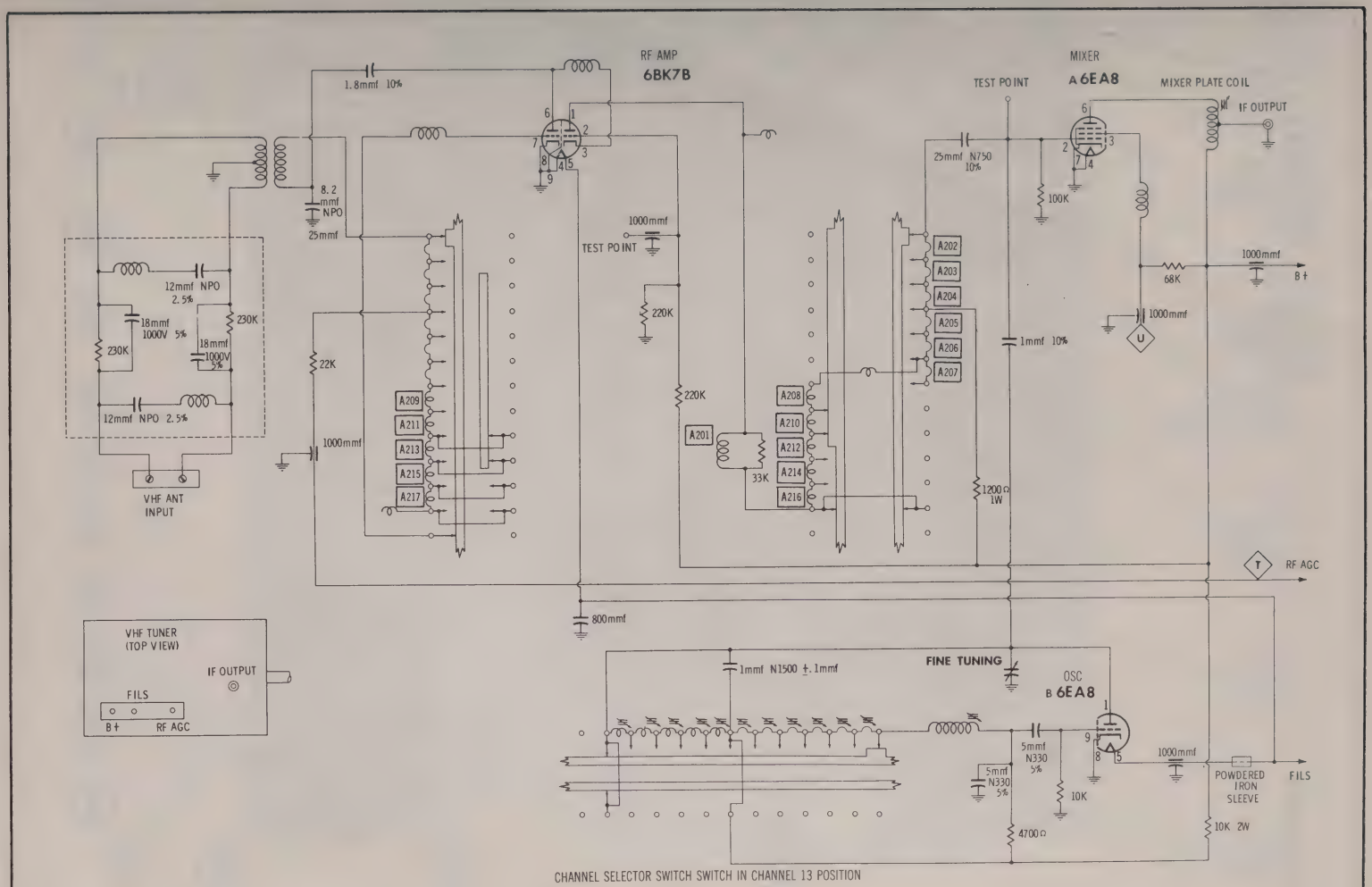
A Howard W. Sams CIRCUITRACE® Photo

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

VHF TUNER 175-158 - BOTTOM VIEW



VHF TUNER 175-158 - TOP VIEW



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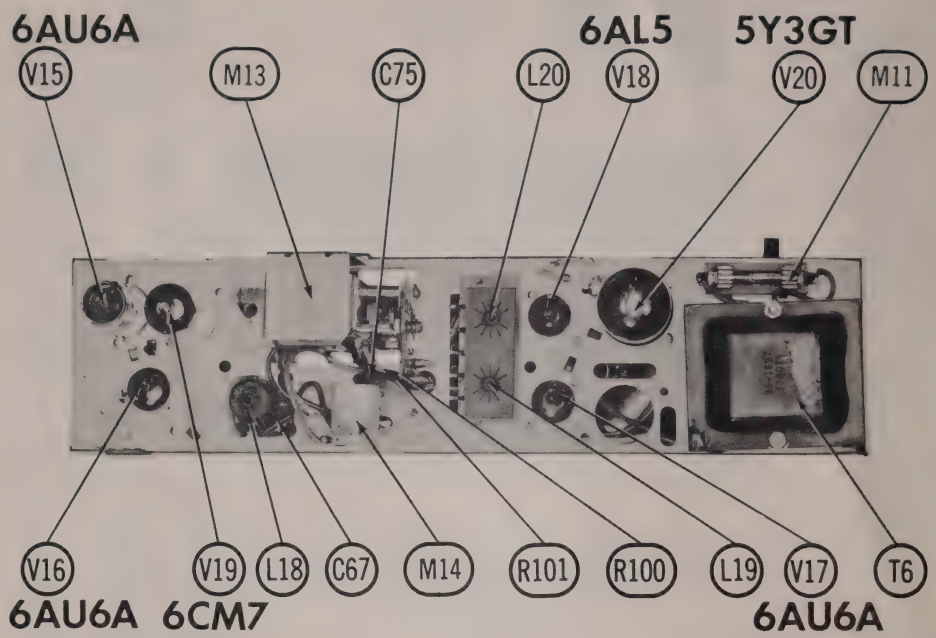
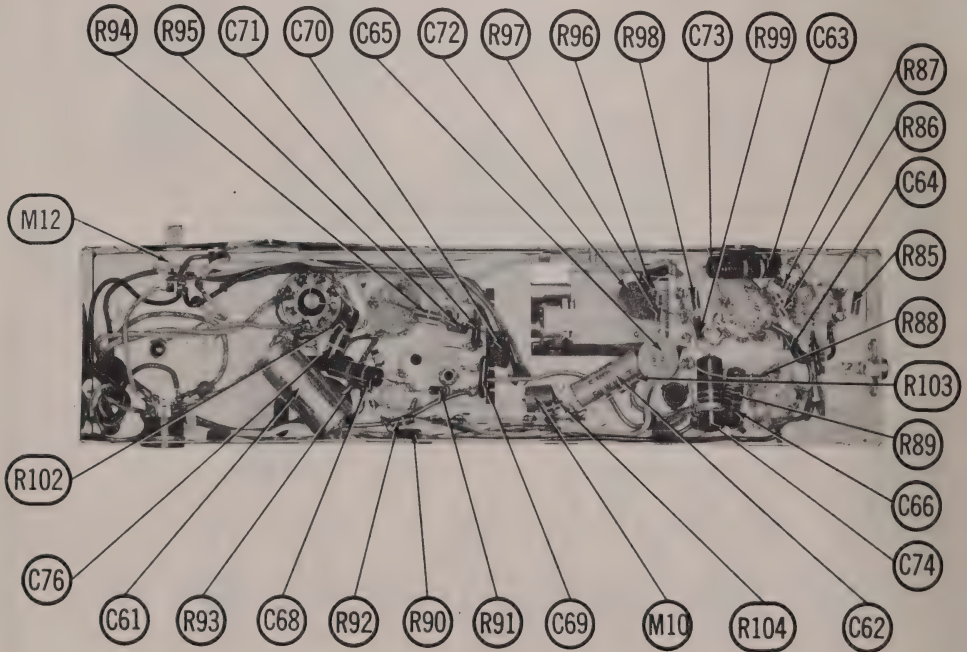
VHF TUNER 175-152

ZENITH CHASSIS 16F25, T, TU, Q, U, 16F26, Q, U

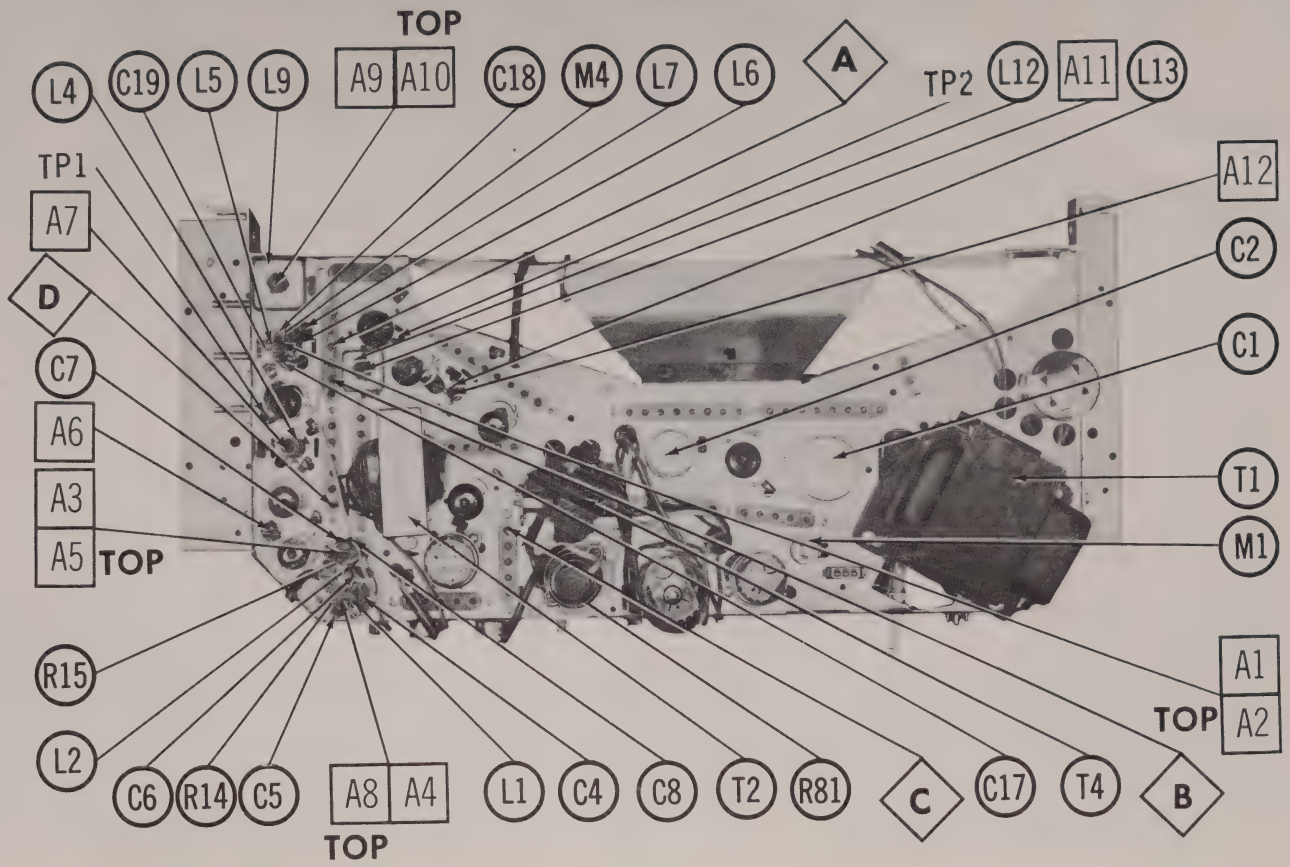


REMOTE CONTROL RECEIVER S-48583 - TOP VIEW



REMOTE CONTROL RECEIVER S-48583 - BOTTOM VIEW

TP1 0V 3RD IF GRID
TP2 125V SOUND IF PLATE

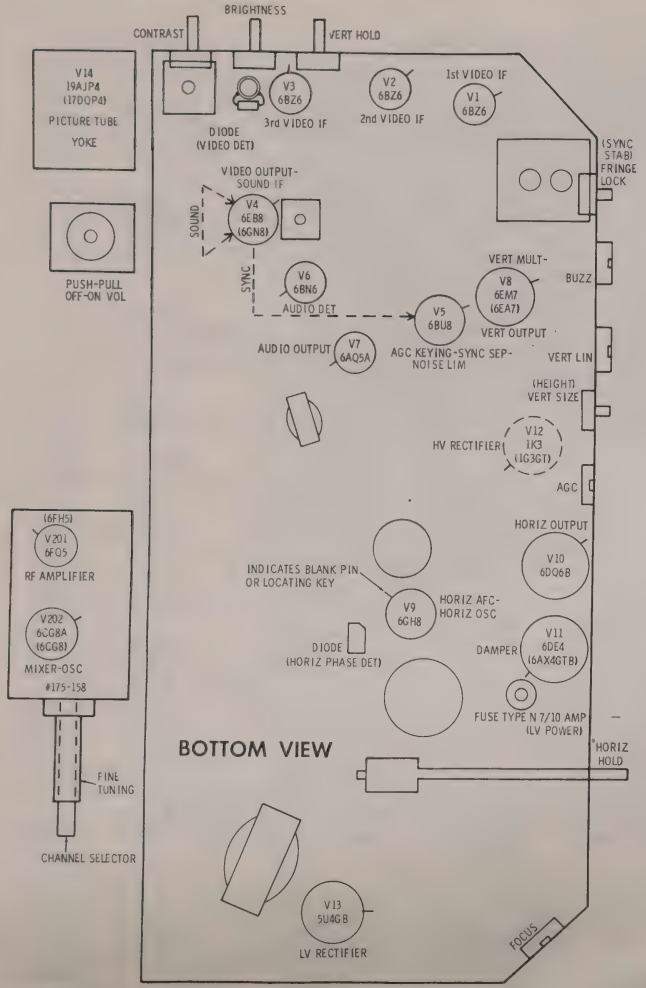


TV CHASSIS - TOP VIEW

ZENITH CHASSIS 16F25,
T, TU, Q, U, 16F26, Q, U

FOLDER 2

TUBE PLACEMENT CHART

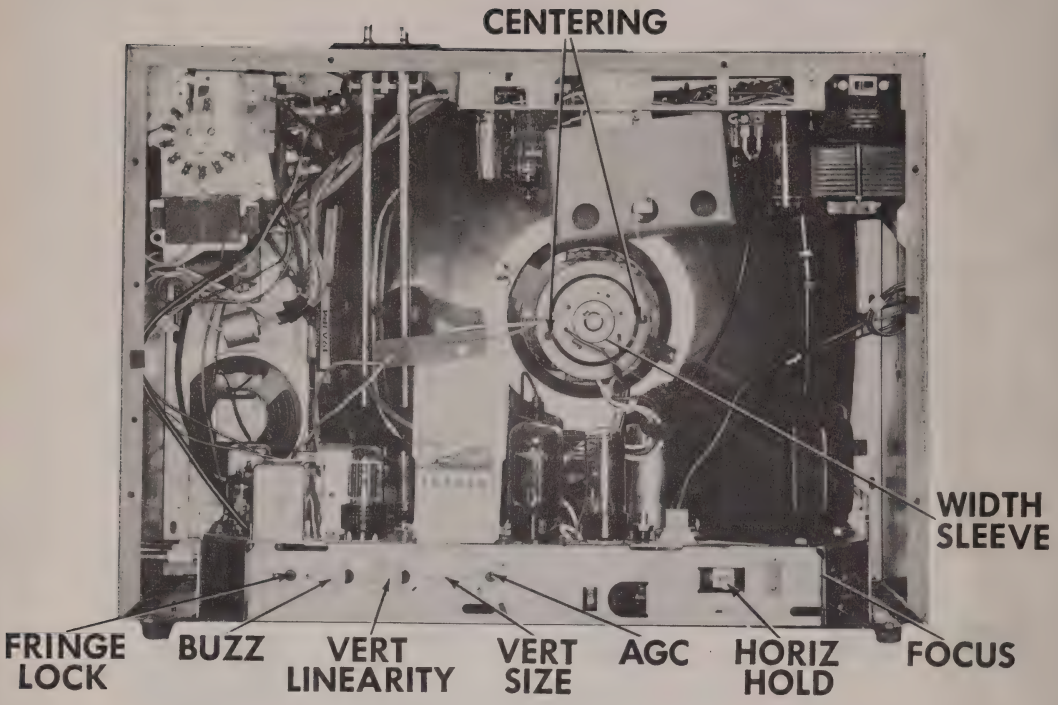


RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	1.4meg	1500Ω	.1Ω	0Ω	▪ 470Ω	▪ 470Ω	1500Ω		
V2	6BZ6	35K	INF	.1Ω	0Ω	† 530Ω	† 530Ω	▪ 27Ω		
V3	6BZ6	0Ω	120Ω	0Ω	.1Ω	† 5600Ω	† 5600Ω	0Ω		
V4	6EB8	0Ω	100K	†470K	.1Ω	0Ω	15Ω	3000Ω	† 22K	† 7500Ω
V5	6BU8	• 9000Ω	† 10K	690K	.1Ω	0Ω	115K	• 400K	† 100K	† 8.2meg
V6	6BN6	• 420Ω	.5Ω	0Ω	.1Ω	† 27K	3.5Ω	† 390K		
V7	6AQ5A	NC	680Ω	0Ω	.1Ω	† 1640Ω	† 1000Ω	• 0Ω		
V8	6EM7	1.8meg	† 420Ω	• 500Ω	• 800K	† • 5meg	0Ω	0Ω	.1Ω	
V9	6GH8	† 100K	100K	† 47K	.1Ω	0Ω	† 82K	100Ω	0Ω	1.6meg
V10	6DQ6B	NC	.1Ω	NC	† 7600Ω	1meg	TP	0Ω	15Ω	TOP CAP † 15Ω
V11	6DE4	TP	TP	¶	NC	† 60Ω	TP	.1Ω	0Ω	
V12	1K3	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP † 205Ω
V13	5U4GB	NC	¶	TP	32Ω	NC	30Ω	TP	¶	
V14	19AJP4	NC	• 180K	.1Ω	0Ω	0Ω	• † 2.5meg	25K		
V201	6FQ5	0Ω	3meg	0Ω	.1Ω	† 5700Ω	0Ω	0Ω		
V202	6CG8A	4700Ω	† 9400Ω	0Ω	0Ω	.1Ω	† 4700Ω	† 4700Ω	0Ω	220K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM PIN 8 OF V13.
† MEASURED FROM PIN 3 OF V11.
▪ MEASURED FROM PIN 2 OF V2.

NC NO CONNECTION
TP TIE POINT



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

The Horizontal Hold is equipped with a stop which limits rotation to approximately 270° with the knob on the shaft. To adjust, remove the knob and adjust by turning the shaft until the picture is synchronized to the point where it is virtually impossible to disrupt horizontal synchronization when switching from channel to channel. Install the knob with its pointer centered between the stops.

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL MODEL F2215L

NOTE: Components are accessible for servicing by removing rear cover and bottom plate.

1. Remove 6 metal screws holding rear cover.
2. Remove rear cover.
3. Remove 1 push-on type knob at front of cabinet.
4. Remove 3 push-on type knobs at side of cabinet.
5. Remove 2 plugs to remote control receiver and remove 3 push-on type leads.
6. Remove 3 screws at back top of cabinet.
7. Remove remote control receiver.
8. Remove high voltage lead, picture tube socket, yoke, and speaker leads.
9. Remove 2 screws holding VHF Tuner assembly.
10. Remove VHF Tuner.
11. Remove 2 screws holding On-Off Switch Bracket.
12. Remove 4 screws holding bottom plate.
13. Remove 4 chassis screws under cabinet.
14. Remove 2 screws (on each side of chassis) in front.
15. Lift cabinet off chassis.

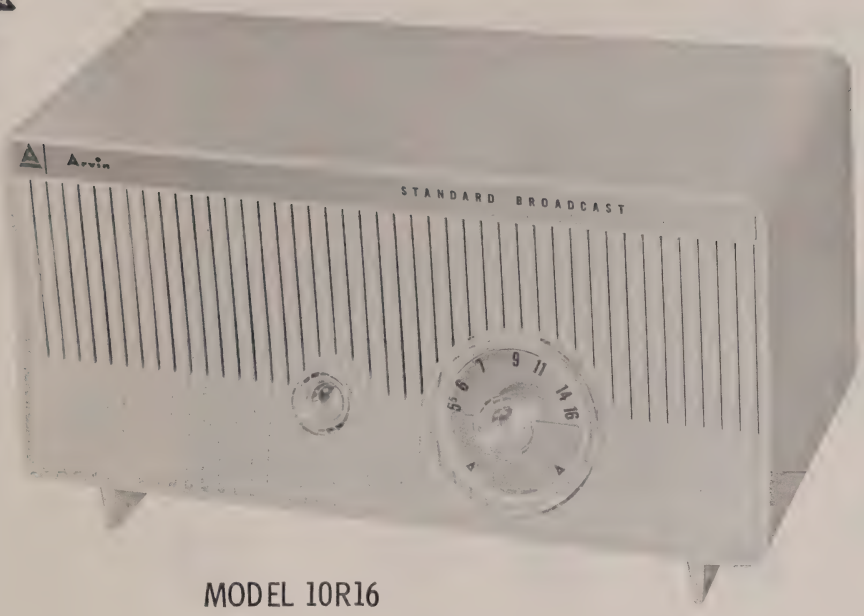
PICTURE TUBE REMOVAL

See Cabinet Removal. It is necessary to remove the cabinet for picture tube replacement.

PHOTOFACT® Folder with CIRCUITRACE®

ARVIN MODELS 10R16, 10R18 (Ch. 1.42202)

ARVIN MODELS 10R16, 10R18 (Ch. 1.42202)



MODEL 10R16

ARVIN MODELS 10R16, 10R18 (Ch. 1.42202)

TRADE NAME	Arvin Models 10R16, 10R18 (Ch. 1.42202)
MANUFACTURER	Arvin Industries, Inc., Columbus, Indiana
TYPE SET	AC-DC Operated 5 Tube AM Receiver
POWER SUPPLY	105 – 125 Volts AC-DC RATING 27 Watts, .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540 – 1670KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1 Thru A4, A6. GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A5, A7..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

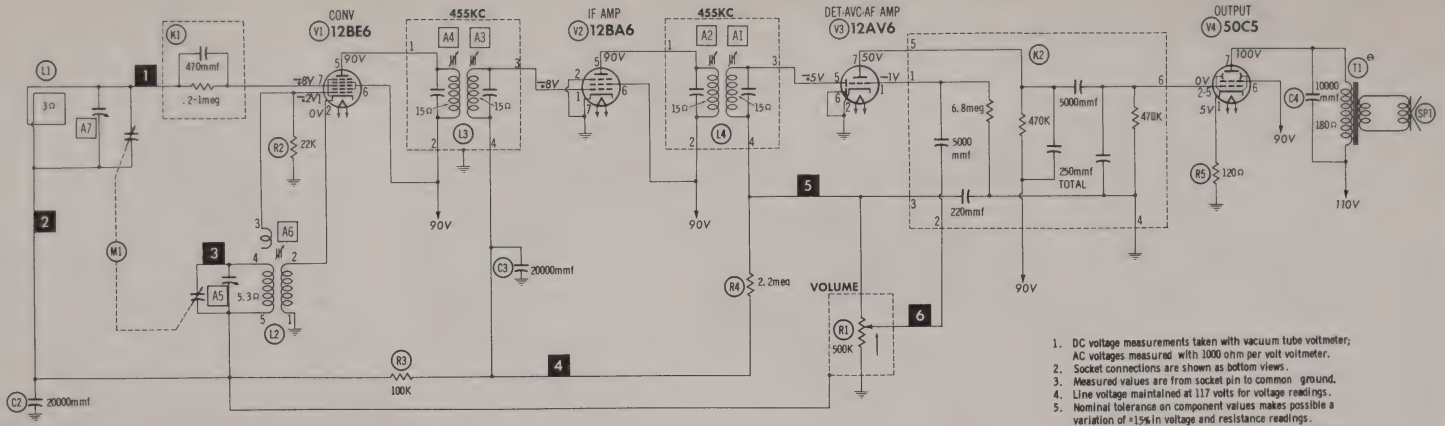
	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .05mfd to pin 7 (grid) of Converter. Low side to chassis.	455KC (400∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	Loop	1670KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	600KC	600KC	"	A6	"
4.	"	1400KC	1400KC Signal.	"	A7	Adjust for maximum output. Repeat Steps 2, 3 and 4.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1961 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

KG355

SET 523 FOLDER 3



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

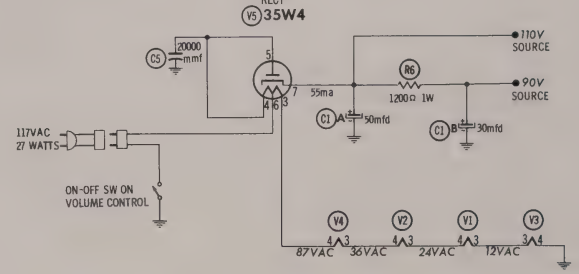
❸ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

TERM VIEW L2

TERM VIEW L3 & L4



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	0Ω	15Ω	30Ω	†1200Ω	†1200Ω	2.8meg
V2	12BA6	2.7meg	0Ω	30Ω	45Ω	†1200Ω	†1200Ω	0Ω
V3	12AV6	6.8meg	0Ω	15Ω	0Ω	500K	0Ω	†470K
V4	50C5	120Ω	470K	45Ω	100Ω	NC	†1200Ω	†180Ω
V5	35W4	TP	TP	100Ω	135Ω	135Ω	130Ω	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V5. NC NO CONNECTION TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC
with CIRCUITRACE®

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ARVIN MODELS 10R16, 10R18 (Ch. 1.42202)

PARTS LIST AND DESCRIPTIONS

TUBES

◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	Converter	12BE6
V2	IF Amplifier	12BA6
V3	Det.-AVC-AF Amp.	12AV6
V4	Output	50C5
V5	Rectifier	35W4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	ARVIN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	50	150	43711-9	PWH2-15-05	B0150 ‡	PFP213.1	TMD-2105 †	PCL-2432	
B	30	150							

‡ Use printed circuit adaptors #55277 & 55278.
† Use printed circuit adaptor #TMA.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C3	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C4	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C5	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ARVIN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	500K	1/3	45250-22					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		REMARKS
		IRC PART No.	WORKMAN TV PART No.	
R2	22K			
R3	100K			
R4	2.2meg			
R5	120Ω			
R6	1200Ω 1W			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		ARVIN PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	
L1	Loop Ant.	44513-2				
L2	Osc.	43644-1				
L3	Input IF	44282-1	BC-356	13-PC9	RTC-8683	
L4	Output IF	44282-1	BC-357	13-PC-10	RTC-8684	

PRINTED BOARD

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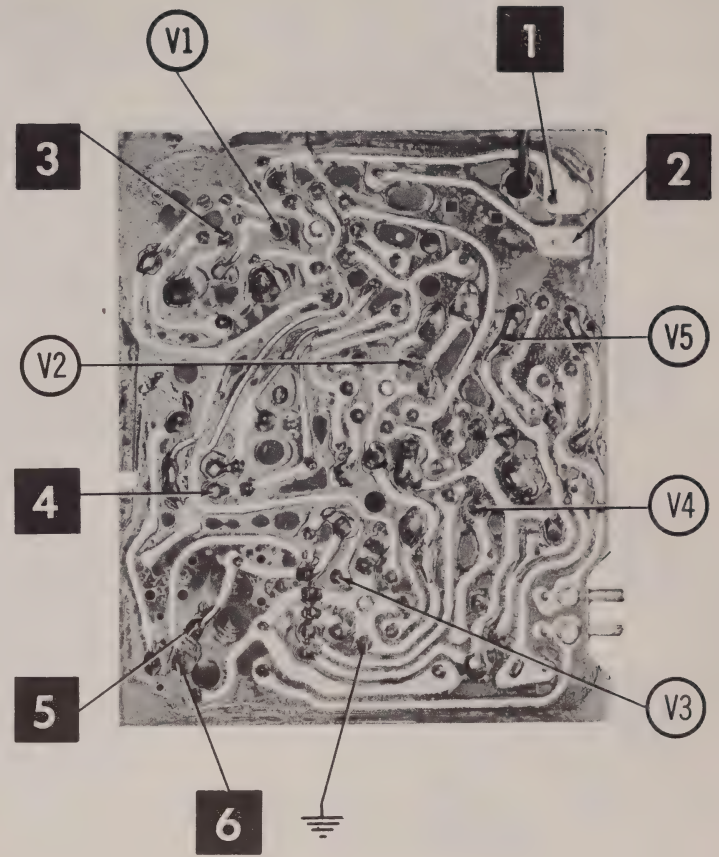
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	ARVIN PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2600Ω	3-4Ω	42700-20 ①	A-3025	A-3332	24S53	S-12X	①Alternate Part #42700-21

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ARVIN PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	45600-12	4A07	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ARVIN PART No.	REPLACEMENT DATA
K1	Conv. Grid Coupling	470mmf, .2-1meg	47796-1	Centralab RC-471 Sprague AC1-1
K2	Audio Coupling	220mmf, 250mmf, 5000mmf, 5000mmf, 470K, 470K, 6.8meg	43743-2	Aerovox PA-512-3 Centralab PA-158 Sprague DT-5

MISCELLANEOUS

ITEM No.	PART NAME	ARVIN PART No.	NOTES
M1	Tuning Cap.	43987	2 Gang

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

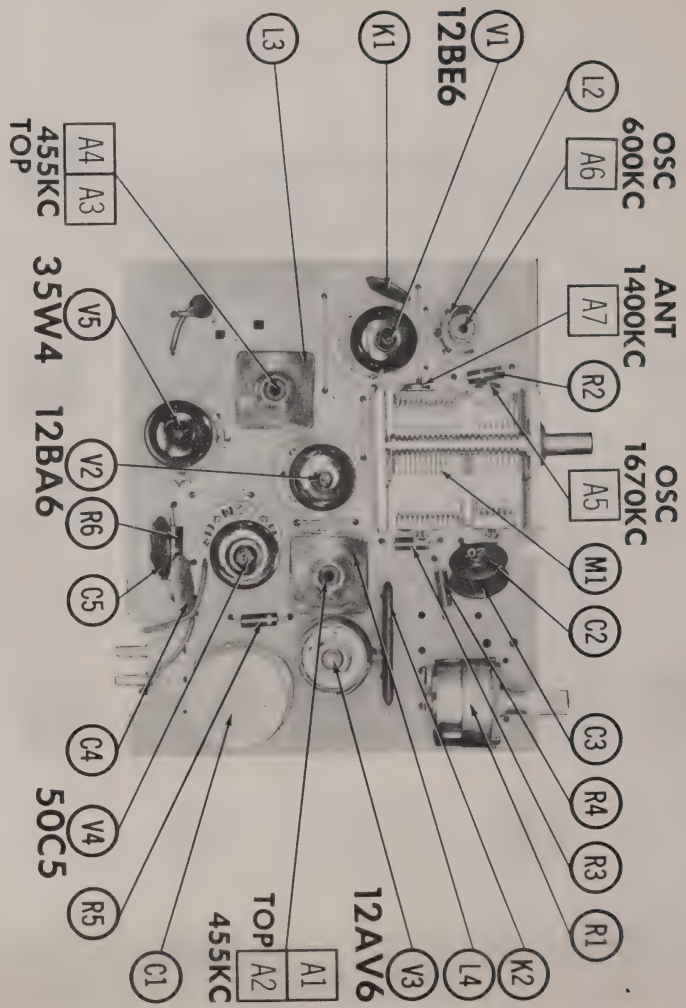
NAME	PART NO.	DESCRIPTION
Knob	47996	Tuning, Clear
Knob	47997	Volume, Clear
Cabinet	47988-106	Ice Green
Cabinet	47988-208	Sandstone

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

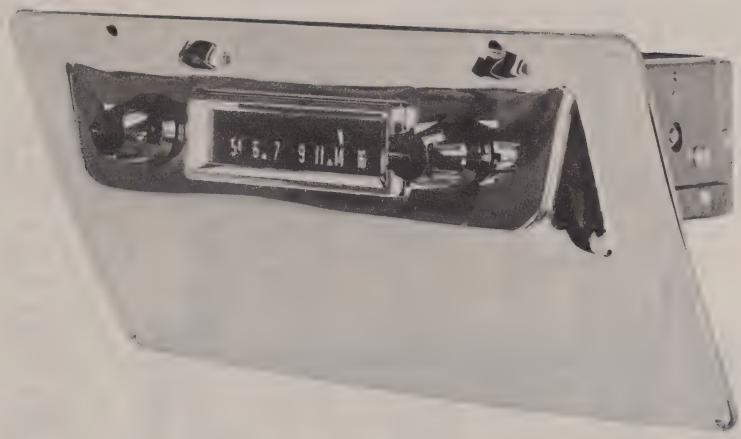
Power Cord (Interlock Type) ..... Use BELDEN No. 8874

CHASSIS—TOP VIEW



PHOTOFACT® Folder

AUTOMATIC
MODEL CEF-119



TRADE NAME	Automatic Model CEF-119 (For English Ford Consuls)
MANUFACTURER	Automatic Radio Mfg. Co., Inc., 122 Brookline Ave., Boston 15, Mass.
TYPE SET	Battery Operated Custom Built 4 Tube - 1 Transistor Automobile AM Receiver
POWER SUPPLY	12 Volt Storage Battery (Positive Ground) RATING 1.6 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	538 – 1610KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1 Thru A4. . GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A5, A6, A7. . . GENERAL CEMENT #5000, 5003, 5066, 8276, 8290, 9087, 9089
WALSCO #2512, 2525, 2528

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to pin 7 (grid) of Converter. Low side to chassis.	265KC (400~ Mod.)	High end stop.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	"	1610KC	"	"	A5	"
3.	Thru dummy (Fig. 1) to antenna receptacle.	"	"	"	A6, A7	"
4.	With radio installed in car and antenna fully extended, tune in a weak station near 1000KC and adjust A7 for maximum output.					

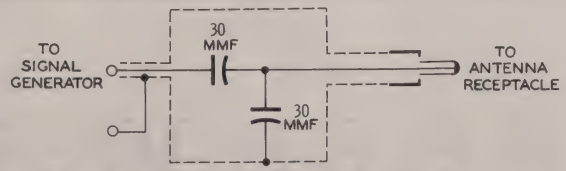


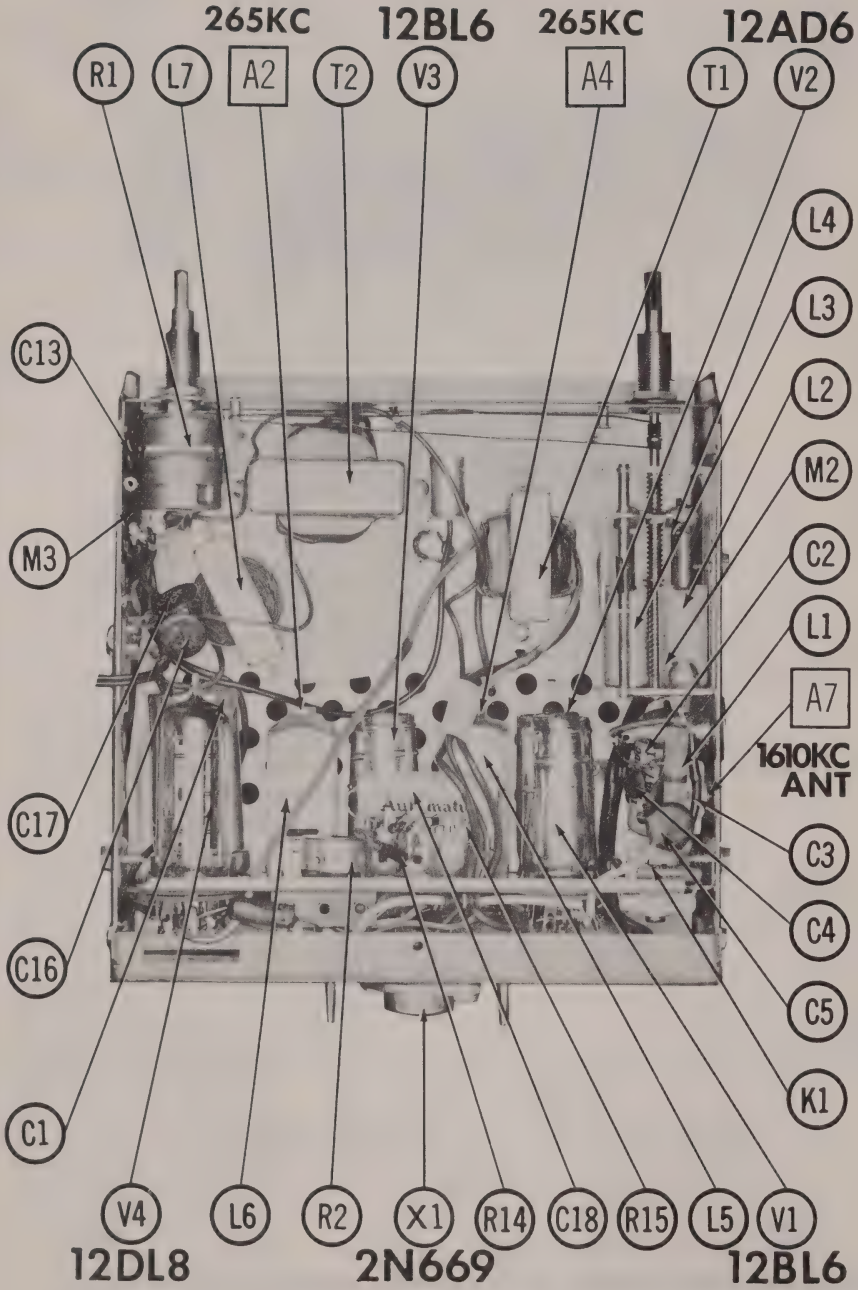
FIG. 1

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

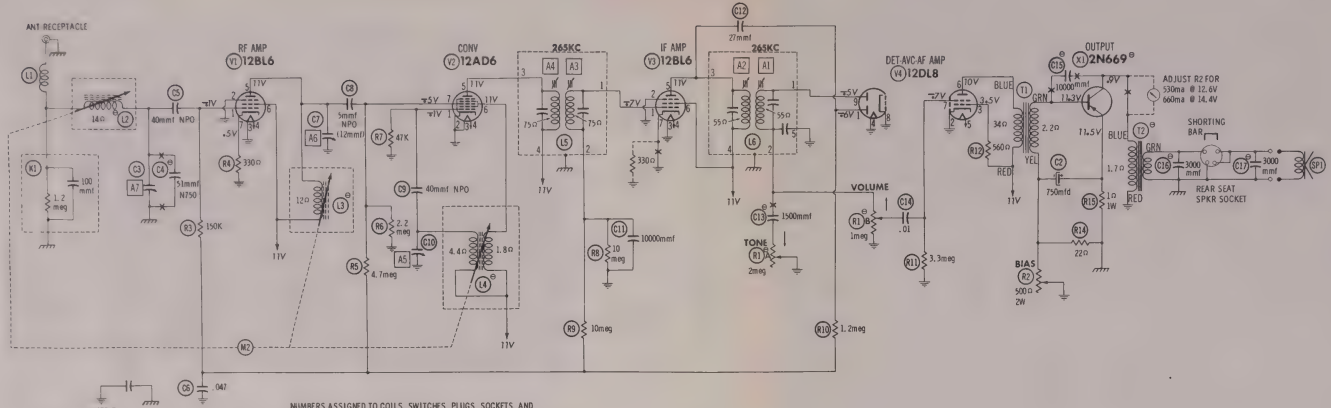
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1961 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

KD360

AUTOMATIC
MODEL CEF-119
AUTOMATIC
MODEL CEF-119
SET 523 FOLDER 4

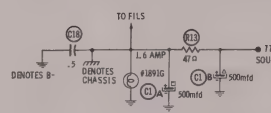


CHASSIS TOP VIEW



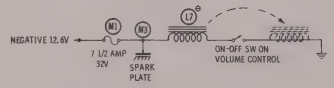
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

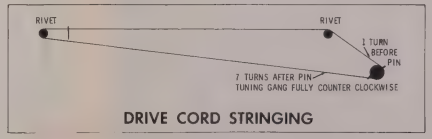
1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BL6	6meg	0Ω	0Ω	2Ω	60Ω	50Ω	330Ω		
V2	12AD6	47K	0Ω	0Ω	2Ω	120Ω	50Ω	2meg		
V3	12BL6	6.8meg	0Ω	0Ω	2Ω	100Ω	50Ω	0Ω		
V4	12DL8	7meg	0Ω	600Ω	0Ω	2Ω	80Ω	3.3meg	0Ω	1meg





⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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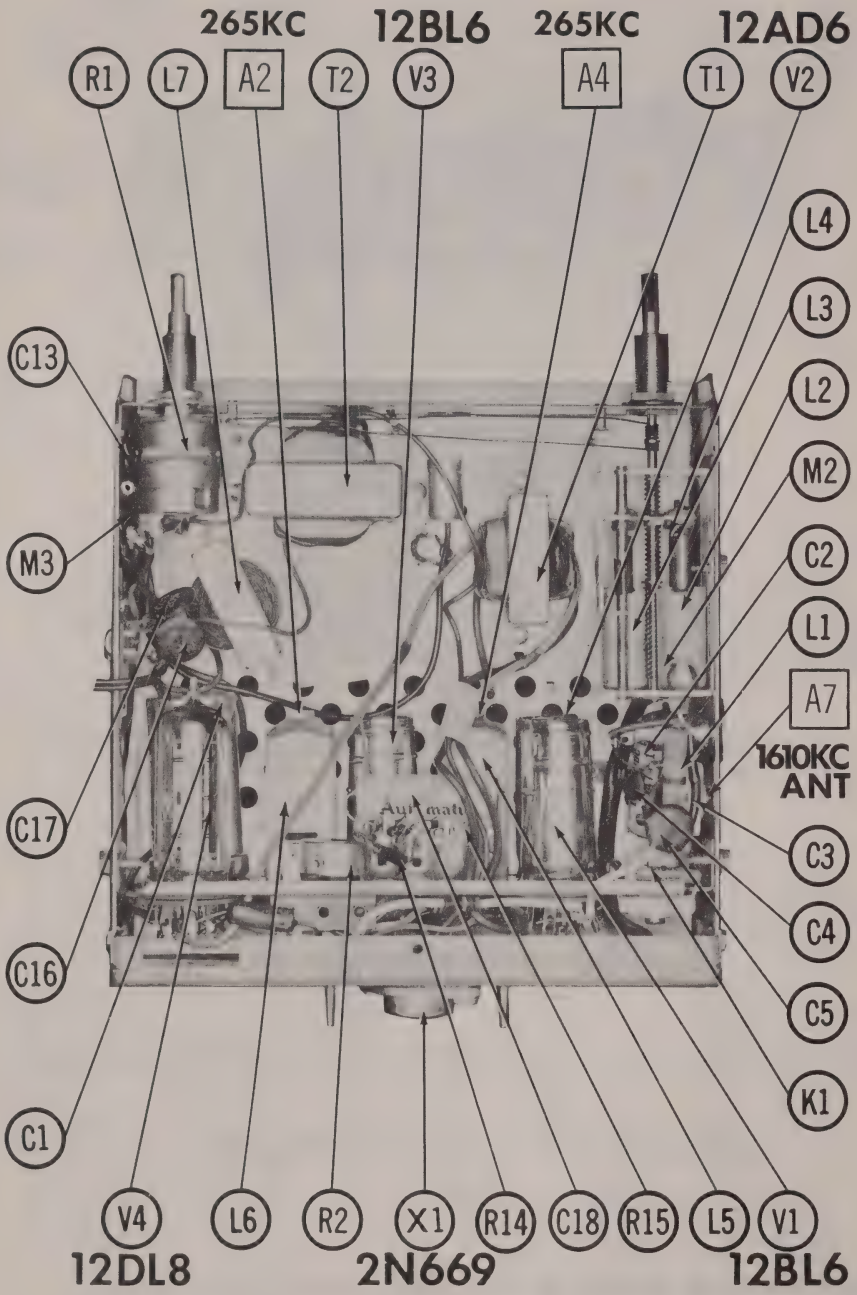
AUTOMATIC
MODEL CEF-119



CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
	◆ GENERAL ELECTRIC ◆			RAYTHEON ◆ SYLVANIA ◆	
V1	RF Amplifier	12BL6	V3	IF Amplifier	12BL6
V2	Converter	12AD6	V4	Det. -AVC-AF Amp.	12DL8

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N669 *	Output				PNP Note 1

* Alternate Type 4347 or equivalent.

Note 1. When replacing, apply silicone grease (General Cement Part #8101 or equivalent) between transistor and chassis. Tighten mounting screws securely and check bias adjustment.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	AUTOMATIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	▪500	15	20-317	AFH3-00-95	B0045	WP200.6		TVLS-2157 *	
B	▲500	15							
C2	750	3	20-757	SRE3V500	BR1000-6	PETA190	TD-1000-6	TVAS-1097 *	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3		#28-800-2						
C4	51 N750	Note 1		TCN-51	C10Q51U			
C5	40 NPO		NPO-DI 39	TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C6	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C7		#28-400-2						
C8	5 NPO	(12) †	NPO-DI 5	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50
C9	40 NPO		NPO-DI 39	TCZ-39	C10Q39C	CCTO-390		10TCC-Q39
C10		#28-461						
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C12	27		DI-27	DD-270	L10Q27	CCD-270	GP427	10TS-Q27
C13	1500	Note 1	BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C14	.01 200V		P288N-01	D5-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C15	10000	Note 1	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C16	3000	Note 2	DI-3000	DD-302	BYA10D3	CCD-302	GP230	10TS-D30

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C17	3000	Note 2	DI-3000	DD-302	BYA10D3	CCD-302	GP230	10TS-D30
C18	.5 100V		P288N-5		CUB2P5	10P-5-504	GEM-205	2TM-P5

\# Automatic Part Number.

† Alternate Value.

Note 1. Not used in some versions.

Note 2. C16 and C17 may be a dual unit in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AUTOMATIC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	2meg		80A1310					Tone Note 1
B	1meg							Volume Note 1
C	Switch							Power Off-On
R2	500Ω	2(WW)	62-503			110-600 *	PFL-600 *	Bias

Note 1. Some versions may use 1meg Volume with switch (Part #80A1240).

* Use 100Ω Resistor in series with terminal.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R3	150K				R10	1.2meg			
R4	330Ω				R11	3.3meg			
R5	4.7meg				R12	560Ω			
R6	2.2meg				R13	47Ω			
R7	47K				R14	22Ω			
R8	10meg				R15	1Ω 1W			
R9	10meg								

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		AUTOMATIC PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	
L1	RF Choke(6.2uh)	①	BC-565	4610	RTC-8520	① IRC Part #CL-1
L2	Ant.	②				② Part of M2
L3	RF	②				
L4	Osc.	②				
L5	Input IF	14-268X	BC-350	12-H1	RTC-8638	
L6	Output IF	14-269X	BC-354	12-H6	RTC-8640	

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ∿)	AUTOMATIC PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
L7	1.8A	.5Ω	.0014 HY	75A1269 ①					①Alternate Part # 75A601.

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	AUTOMATIC PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	5.5	1	75A1264					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	AUTOMATIC PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	16Ω	3-4Ω	75A1272①					① Alternate Part #75A1270

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	AUTOMATIC PART No.	QUAM PART No.	
SP1	5"	PM	3-4Ω	73A1275	5A07R	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	AUTOMATIC PART No.	REPLACEMENT DATA
K1	Antenna Filter	100mmf, 1.2meg	89-4204	Sprague PAC-9

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AUTOMATIC PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	SFE	7½A 32V			30707.5 (7½A 32V SFE)	155009	SFE 7½	HDH

MISCELLANEOUS

ITEM No.	PART NAME	AUTOMATIC PART No.	NOTES
M2	Tuner	78A1232	
M3	Spark Plate		

CABINETS & CABINET PARTS

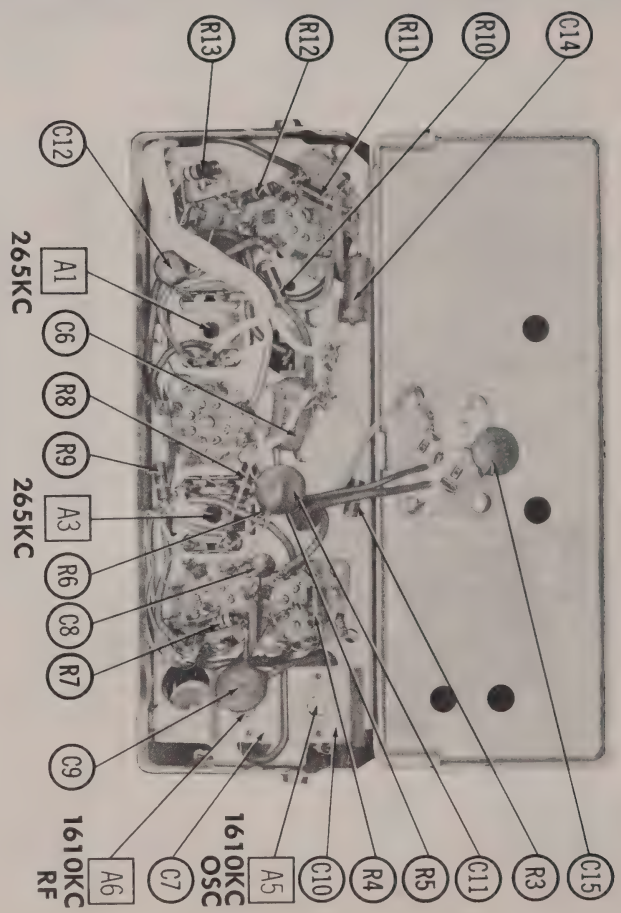
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	47A1235	Tuning, Volume
Knob	47A1249	Dummy

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire	Use BELDEN No. 8885
Bonding Strap	Use BELDEN No. 8661

CHASSIS—END VIEW



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BELL SOUND MODELS 5625M, 5625M3

BELL SOUND MODELS
5625M, 5625M3

MODEL 5625M3

BELL SOUND MODELS
5625M, 5625M3

TRADE NAME	Bell Sound Models 5625M, 5625M3
MANUFACTURER	Bell Sound Div., Thompson Ramo Wooldridge Inc., 555 Marion Road, Columbus 7, Ohio
TYPE SET	AC-Battery Operated 8 Tube Amplifier With Manual Phono
POWER SUPPLY	117 Volts AC, 60 Cycles (or) 6 Volt Storage Battery (or) 12 Volt Storage Battery
RATING	115 Watts, 1.1 Amp. @117 Volts AC, 60 Cycles (or) 16 Amp. @6.3 Volts DC (or) 8 Amp. @12.6 Volts DC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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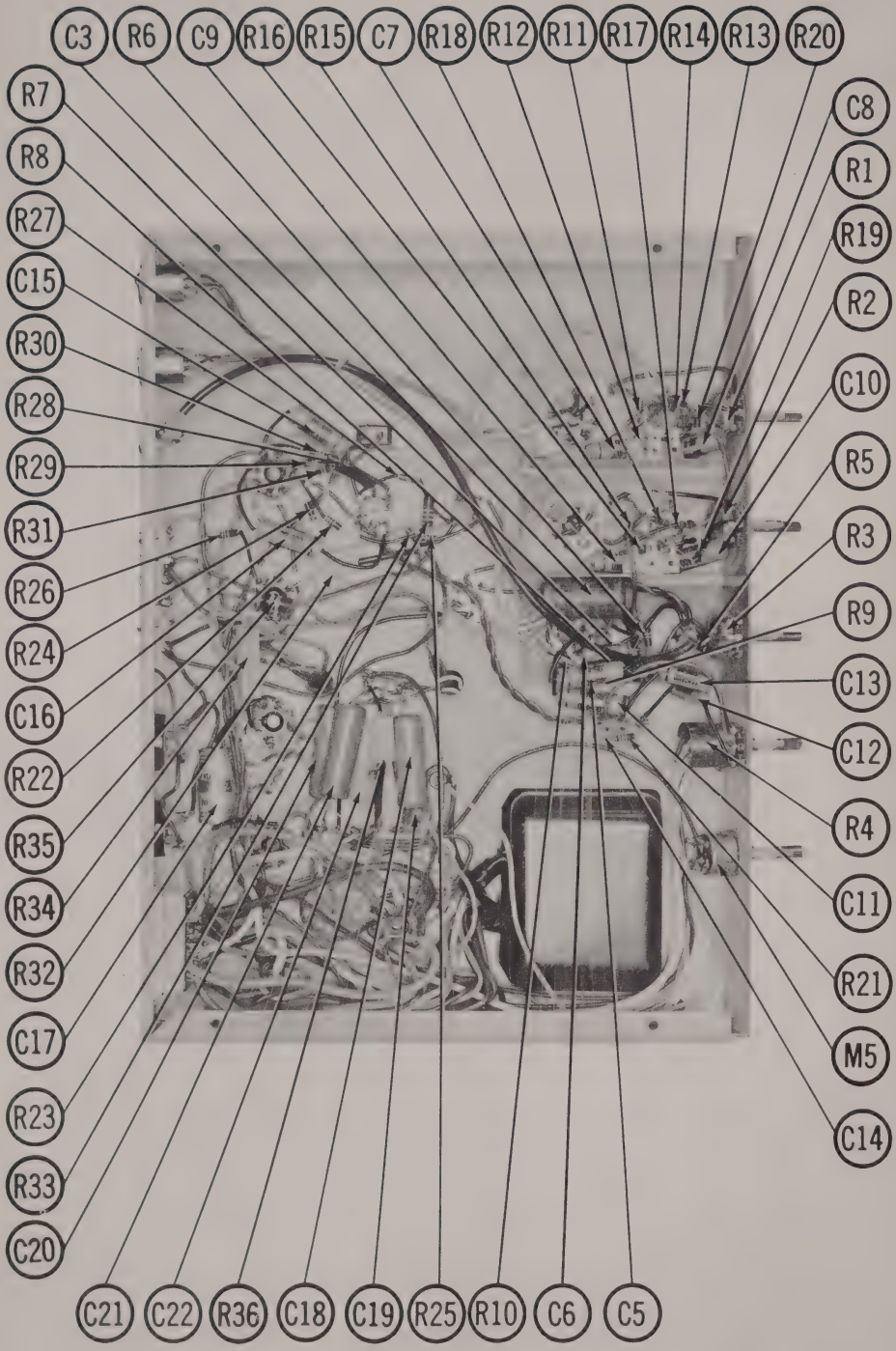
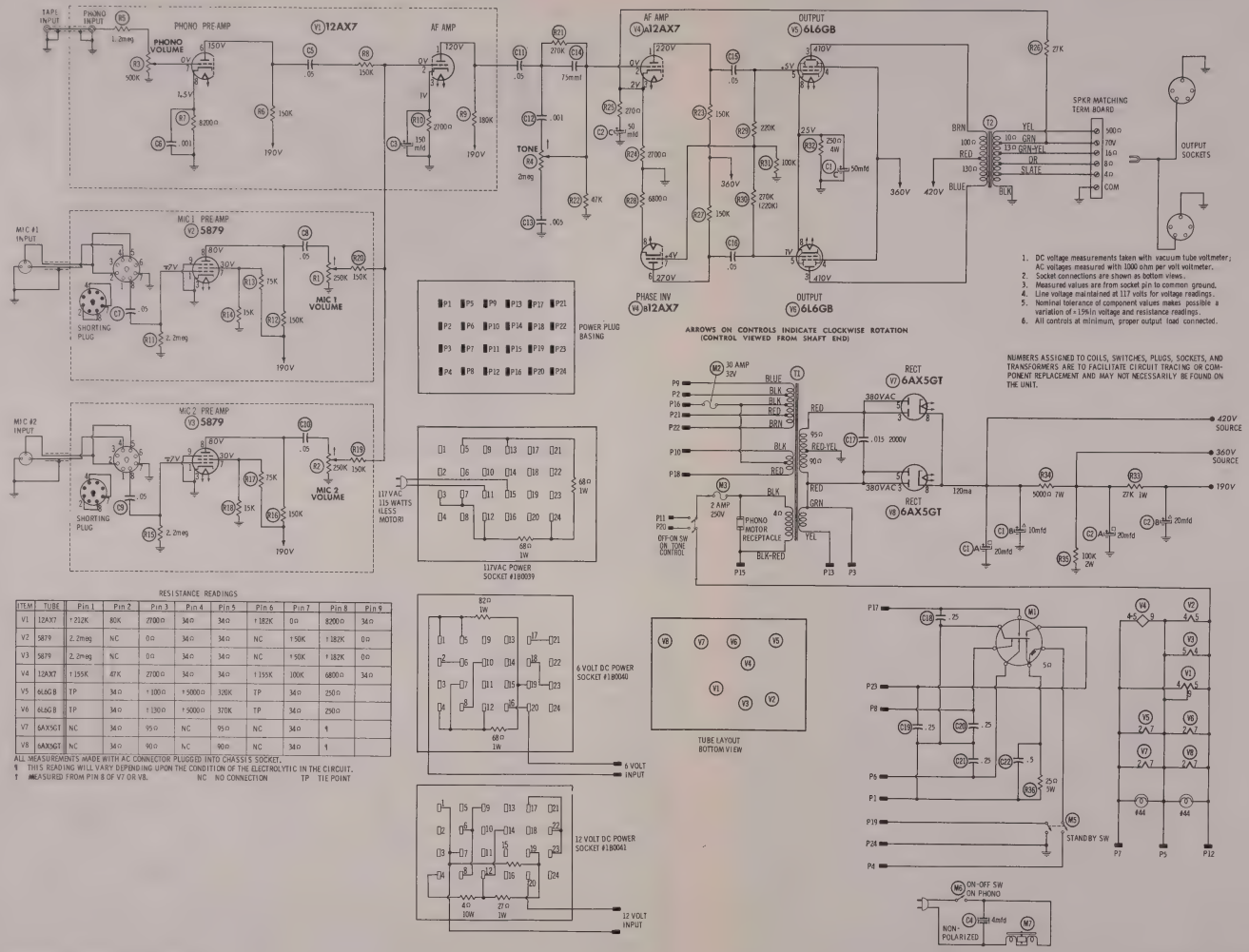


CHASSIS BOTTOM VIEW



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†212K	80K	2700Ω	34Ω	34Ω	†182K	0Ω	8200Ω	34Ω
V2	5879	2.2meg	NC	0Ω	34Ω	34Ω	NC	†50K	†182K	0Ω
V3	5879	2.2meg	NC	0Ω	34Ω	34Ω	NC	†50K	†182K	0Ω
V4	12AX7	†155K	47K	2700Ω	34Ω	34Ω	†155K	100K	6800Ω	34Ω
V5	6L6GB	TP		34Ω	†100Ω	†5000Ω	320K	TP	34Ω	250Ω
V6	6L6GB	TP		34Ω	†130Ω	†5000Ω	370K	TP	34Ω	250Ω
V7	6AX5GT	NC		34Ω	95Ω	NC	95Ω	NC	34Ω	¶
V8	6AX5GT	NC		34Ω	90Ω	NC	90Ω	NC	34Ω	¶

ALL MEASUREMENTS MADE WITH AC CONNECTOR PLUGGED INTO CHASSIS SOCKET.
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 8 OF V7 OR V8. NC NO CONNECTION TP TIE POINT

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BELL SOUND MODELS 5625M, 5625M3

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	• GENERAL ELECTRIC • RAYTHEON • SYLVANIA • USE	TYPE	ITEM No.	USE	TYPE
V1	Phono Preamp. -AF Amp.	12AX7	V5	Output	6L6GB
V2	Mic 1 Preamp.	5879	V6	Output	6L6GB
V3	Mic 2 Preamp.	5879	V7	Rectifier	6AX5GT
V4	AF Amp. -Phase Inv.	12AX7	V8	Rectifier	6AX5GT

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA BELL SOUND PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■20	450	B-20048P23	AFH3-138	C0970	FP366	TMT-3640	TVL-3751	
B	▲10	450							
C	50	50							
C2A	■20	450	B-20048P35	AFH3-138	C0970	FP366	TMT-3640	TVL-3751	
B	▲20	450							
C	50	25							
C3	150	15	B-20053P14	PRS1370	BR1505	TC25015	TD-150-50	TVA-1311	
C4	4	236VAC	B-20052P33	RMO-962	KGNT-2040				

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C6	.001 400V		P488N-001	D6-102	CUB6D1	6DP-1-102	GEM-421	6TM-D10
C7	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C8	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C9	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C10	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C11	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C12	.001 400V		P488N-001	D6-102	CUB6D1	6DP-1-102	GEM-421	6TM-D10
C13	.005 400V		P488N-005	D6-502	CUB6D5	6DP-1-502	GEM-425	6TM-D50
C14	75 500V		1468-000075	D6-750	22RQ75	CM-20B-750M	MC230	1FM-475
C15	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C16	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C17	.015 2000V	#B-20052P16						
C18	.25 200V		P288N-25		CUB2P25	2DP-4-254	GEM-2025	2TM-P25
C19	.25 200V		P288N-25		CUB2P25	2DP-4-254	GEM-2025	2TM-P25
C20	.25 200V		P288N-25		CUB2P25	2DP-4-254	GEM-2025	2TM-P25
C21	.25 200V		P288N-25		CUB2P25	2DP-4-254	GEM-2025	2TM-P25
C22	.5+400V		P488N-5		CUB4P5	4DP-6-504	GEM-405	4TM-P50

Bell Sound Part Number.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA BELL SOUND PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	250K	1/2	B20066P145	B-51	A47-250K-Z	Q13-130	U44	Mic 1 Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	250K	1/2	B20066P145	B-51	A47-250K-Z	Q13-130	U44	Mic 2 Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	500K	1/2	B20066P142	B-60	A47-500K-Z	Q13-133	U48	Phono Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R4A	2meg	1/2	B20066P144	B-76	A47-2meg-Z	Q13-139	U55	Tone
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KR-2	SWE-20	76-2	US-27	Power Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R5	1.2meg			
R6	150K			
R7	8200Ω			
R8	150K			
R9	180K			
R10	2700Ω			
R11	2.2meg			
R12	150K			
R13	75K			
R14	15K			
R15	2.2meg			
R16	150K			
R17	75K			
R18	15K			
R19	150K			
R20	150K			

* Alternate Value.

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R21	270K			
R22	47K			
R23	150K			
R24	2700Ω			
R25	270Ω			
R26	27K			
R27	150K			
R28	6800Ω			
R29	220K			
R30	270K			(220K) *
R31	100K			
R32	250Ω 4W	PW5-250	5W-SQ-250	
R33	27K 1W			
R34	5000Ω 7W	PW10-6000	10W-SQ-5000	
R35	100K 2W			
R36	25Ω 5W	PW5-25	5W-SQ-25	

TRANSFORMER (POWER)

ITEM No.	RATING INPUT	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA BELL SOUND PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	117V *@ 1.1A or 6.3VCT @ 9A or 12.6VCT @ 4.5A	760VCT @ 120A	6.3V @ † 6.2A	B20287					* For Phono Motor Power on DC Operation. † Not used on DC Operation.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	BELL SOUND PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	10K CT	500Ω Tap @ 70V, 16Ω, 8Ω, 4Ω	B20290					

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				BELL SOUND PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Int.	6	60~		3485		3485	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			BELL SOUND PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	30A 32V	B-20043P25		311030 (3AG 30A 32V)		AGC 30	HKP
M3	3AG	2A 250V	B-20043P1		312002 (3AG 2A 250V)	342001	AGC 2	HKP

PHONO CARTRIDGE & NEEDLES

*NEEDLE LISTINGS SHOWN ARE FOR RESPECTIVE REPLACEMENT CARTRIDGES ONLY.

ITEM No.	REPLACEMENT DATA								NOTES
	BELL SOUND PART No.		ASTATIC PART No.		ELECTRO-VOICE PART No.		SONOTONE PART No.		
	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	
M4	B-20237P4*	Not Req.	55T	Not Req.	47	Not Req.	2T-S	Not Req.	* Includes Tone Arm

MISCELLANEOUS

ITEM No.	PART NAME	BELL SOUND PART No.	NOTES
M5	Switch	B-20105P21	Standby (Rotary Wafer Type)
M6	Switch	B-20105P2	Phono Off-On (Part of Phono Player) (Toggle)
M7	Motor	B-20239P7	Phono Drive (Part of Phono Player)
	Power Cord	1B0039	117VAC
	Power Cord	1B0040	6VDC
	Power Cord	1B0041	12VDC

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

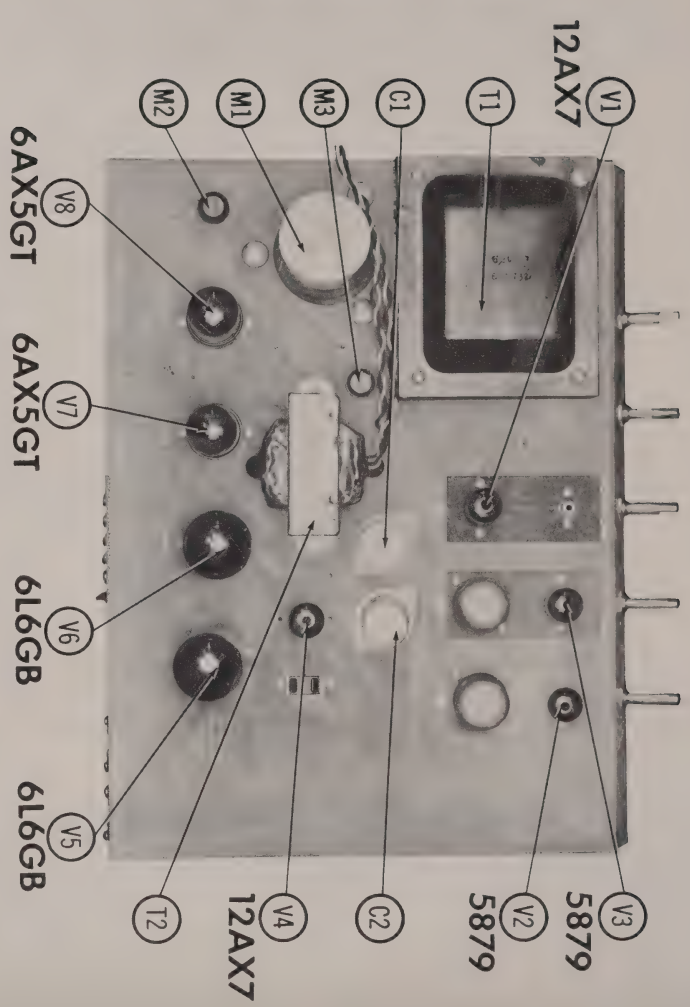
NAME	PART NO.	DESCRIPTION
Knob	84A55	Mic 1, Mic 2, Phono, Tone, Power

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

CHASSIS—TOP VIEW



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CONTINENTAL MODEL TR-630

CONTINENTAL MODEL TR-630

TRADE NAME	Continental Model TR-630		
IMPORTER	Continental Merchandise Co., 236 Fifth Ave., New York 1, N. Y.		
TYPE SET	Battery Operated Transistorized AM Receiver		
POWER SUPPLY	6 Volts DC	RATING	7MA@6 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	540 — 1600KC		20MA@6 Volts DC (Signal, Normal Volume)

NOTE: TO REPLACE BATTERIES, REMOVE LARGE CENTER SCREW FROM BOTTOM COVER. REMOVE COVER. THE SMALLER SCREW SHOULD NOT BE TURNED.

ALIGNMENT INSTRUCTIONS

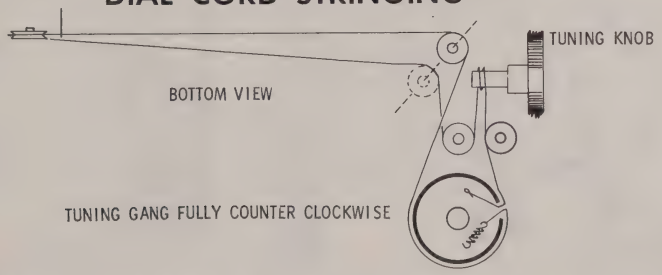
ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2, A3... GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538
A4, A6.....GENERAL CEMENT #5000, 5003, 5066, 8276, 8290, 9087, 9089
WALSCO #2512, 2525, 2528

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	1600KC	1600KC	"	A4	"
3.	"	600KC	600KC	"	A5	"
4.	"	1400KC	1400KC	"	A6	"
5.	"	600KC	600KC	"	A7	Adjust for maximum output. Repeat Steps 2 thru 5.

DIAL CORD STRINGING



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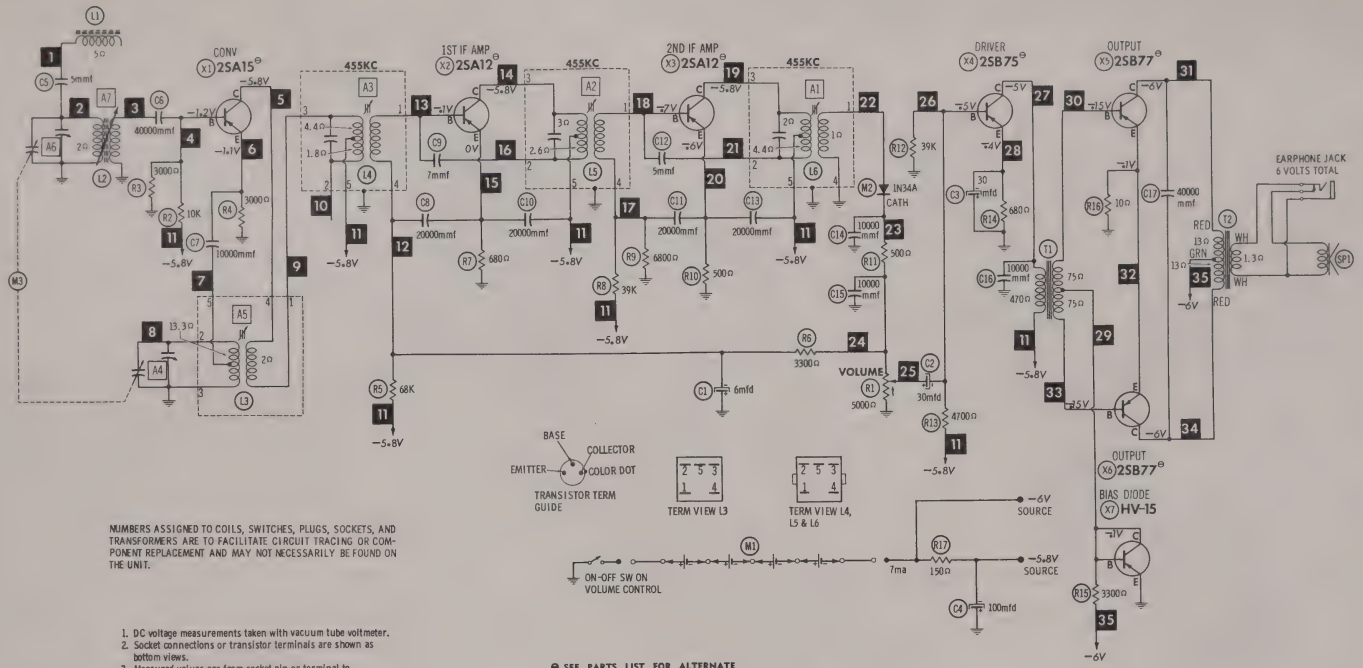
KG354

SET 523 FOLDER 6



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

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CONTINENTAL MODEL TR-630

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2SA15 ①	Converter	2N219	2N486	2N219	PNP
X2	2SA12 ②	1st IF Amplifier	2N218	2N483	2N218	PNP
X3	2SA12 ③	2nd IF Amplifier	2N218	2N483	2N218	PNP
X4	2SB75 ③	Driver	2N217	2N362	2N104	PNP
X5	2SB77 ④	Output	2N217	2N631	2N217	PNP
X6	2SB77 ④	Output	2N217	2N631	2N217	PNP
X7	HV-15	Bias Diode	1N2326	1N295		PNP

① Alt. -2N219
② Alt. -2N218
③ Alt. -2N215
④ Alt. -2N217

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Continental PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	6	6		XPP-6006	NLW6-15	TT10X6	MLV5-6	TE-1085	
C2	30	6		PTT-6030	NLW30-6	TT6X30	ML30-6	TE-1092	
C3	30	6		PTT-6030	NLW30-6	TT6X30	ML30-6	TE-1092	
C4	100	6		PTT-6100	NLW100-12	TT6X100	ML100-6	TE-1102	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	5		NPO-DI 5	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50
C6	40000			DD-403	BYB6S4	DP-1-403	GP140	
C7	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C8	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C9	7		NPO-DI 6. 8	DTZ-6R8	C10V7C	CCTO-6R8	CNO-568	10TCC-V68
C10	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C11	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C12	5		NPO-DI5	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50
C13	20000		BPD-05	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C14	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C15	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C16	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C17	40000			DD-403	BYB6S4	DP-1-403	GP140	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Continental PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/4	TV-200A					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R2	10K				R10	500Ω			
R3	3000Ω				R11	500Ω			
R4	3000Ω				R12	39K			
R5	68K				R13	4700Ω			
R6	3300Ω				R14	680Ω			
R7	680Ω				R15	3300Ω			
R8	39K				R16	10Ω			
R9	6800Ω				R17	150Ω			

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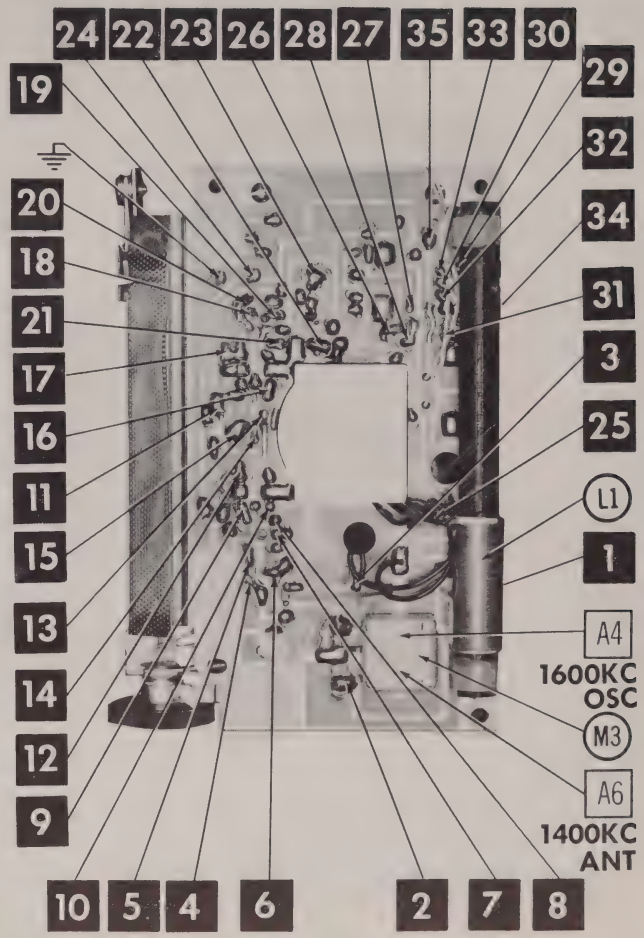


PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		Continental PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	
L1	Ant.	AM-L-1				
L2	Loopstick	AM-L-2				
L3	Osc.	7064				
L4	1st IF	6020				
L5	2nd IF	6021				
L6	3rd IF	5239				

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Continental PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.7	1	TRT-13					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Continental PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	500Ω CT	10-12Ω	TRT 4		TA-20	TR-16		

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Continental PART No.	QUAM PART No.	
SP1	3"	PM	10-12Ω	PA-301		

BATTERIES

ITEM No.	VOLTAGE	Continental PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V	UM-3A *		930 *		1015 *		M-15F*	* 4 Required

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Continental PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N34A	1N34A		1N34A	1N34A	Detector (Pigtail)

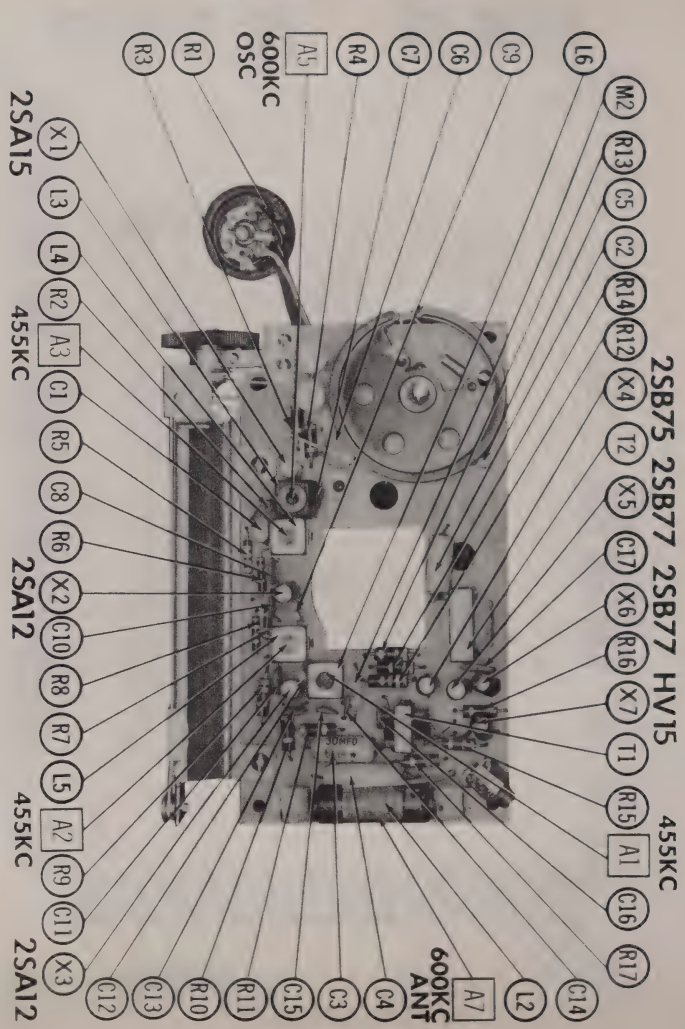
MISCELLANEOUS

ITEM No.	PART NAME	Continental PART No.	NOTES
M3	Tuning Cap.	PV-P5	2 Gang

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



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JEFFERSON-TRAVIS
MODELS JT-H105, JT-H105S

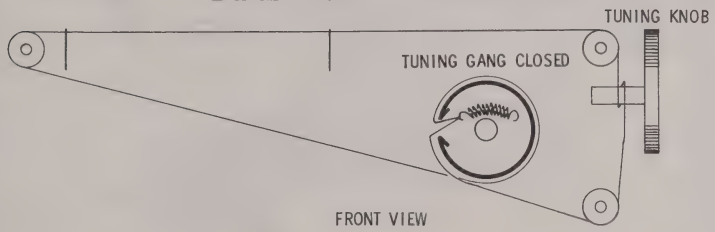
JEFFERSON-TRAVIS
MODELS JT-H105, JT-H105S

MODEL JT-H105

JEFFERSON-TRAVIS
MODELS JT-H105, JT-H105S

TRADE NAME	Jefferson-Travis Models JT-H105, JT-H105S		
SUPPLIER	Jefferson-Travis, Inc., Subsidiary of Emerson Radio & Phonograph Corp., 524 W. 23rd St. Ney York 11, N. Y.		
TYPE SET	Battery Operated Transistorized Portable BC-SW Receiver		
POWER SUPPLY	6 Volts DC	RATING	10MA @ 6 Volts DC (No Signal, Min. Volume) 20MA @ 6 Volts DC (Signal, Normal Volume)
TUNING RANGES—BROADCAST	540-1600KC	SHORT WAVE 1	3.8-6.8MC
SHORT WAVE 2	5.8-12MC		

DIAL CORD STRINGING



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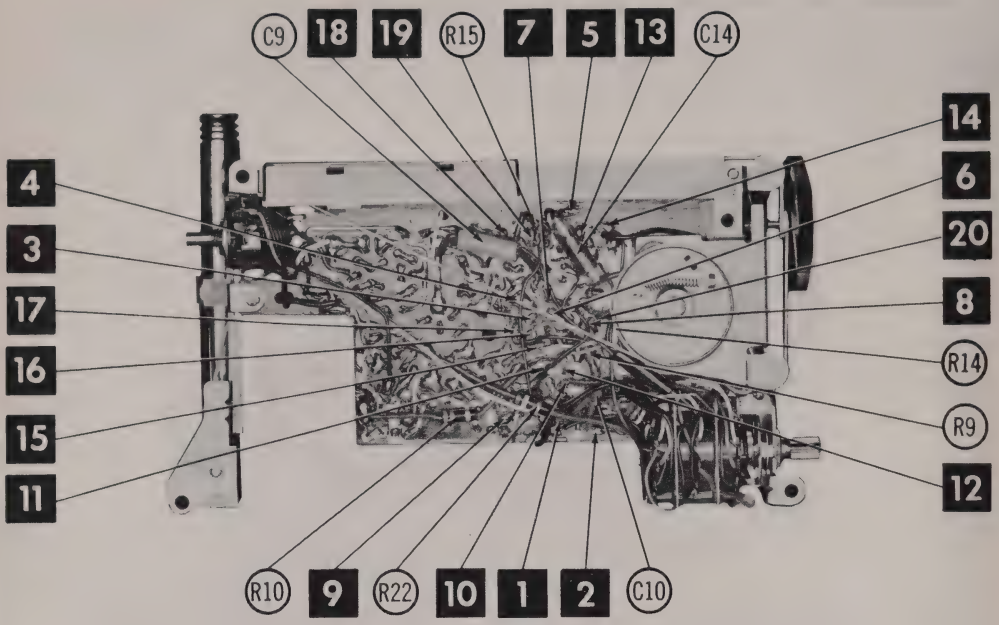
KF267

SET 523 FOLDER 7



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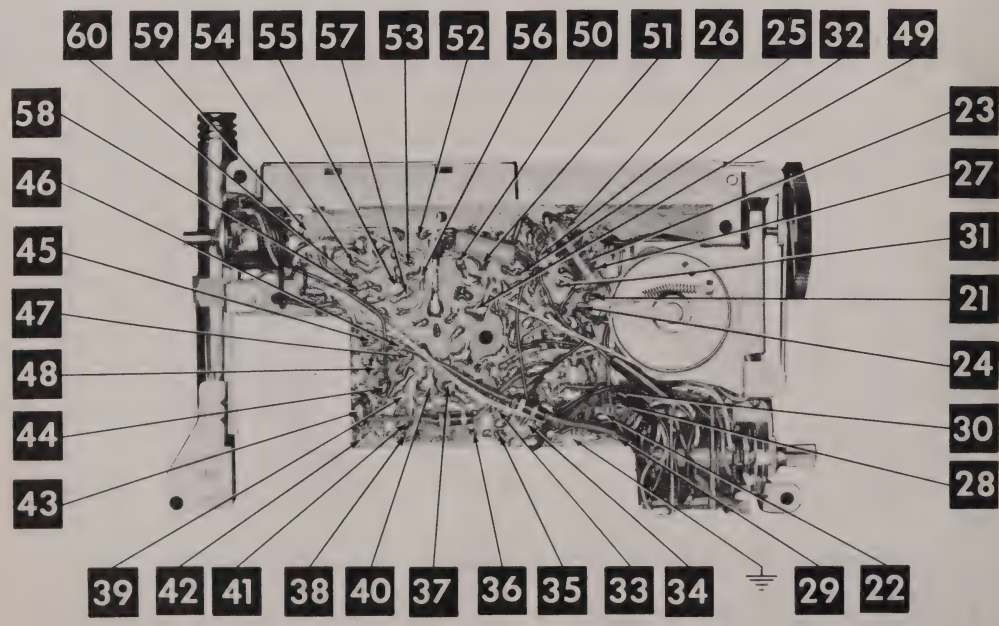

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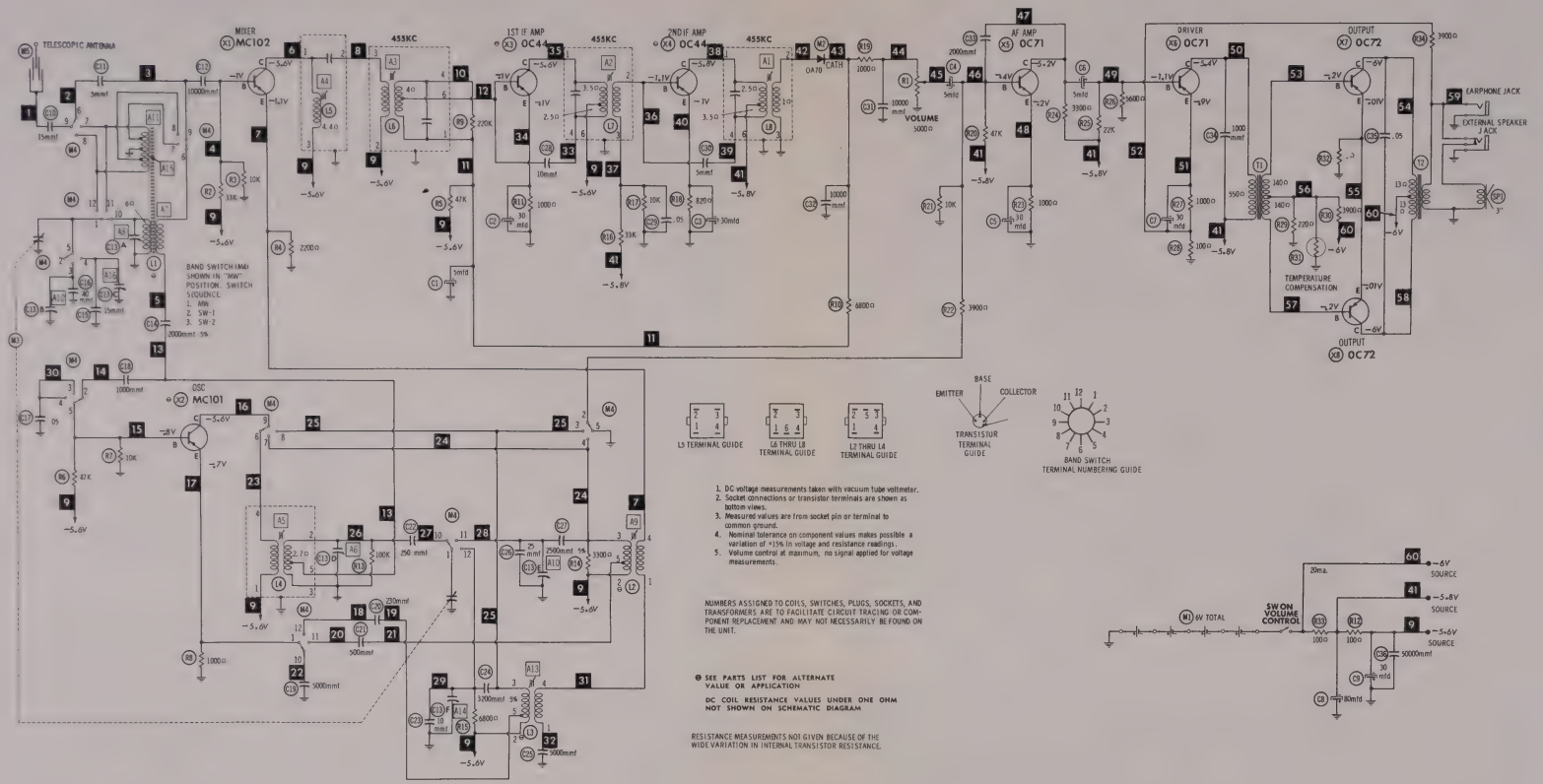

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

⊕ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE
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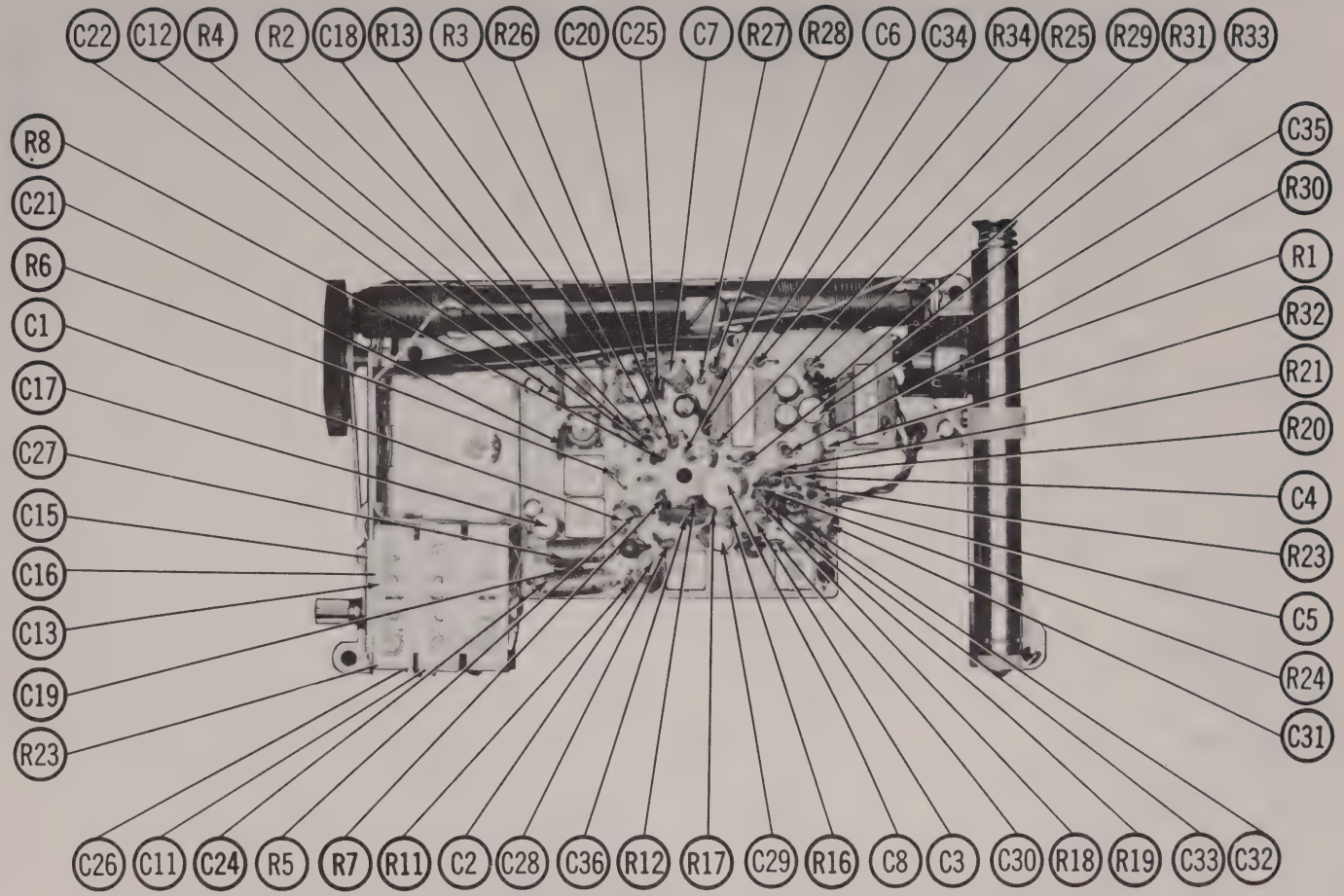
JEFFERSON-TRAVIS
MODELS JT-H105, JT-H105S



CHASSIS TOP VIEW—CAPACITOR AND RESISTOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A6, A8, A10, A12, A14, A16 . GENERAL CEMENT #5000, 5003, 5066, 8276, 8290, 9087, 9089
WALSCO #2512, 2525, 2528
A9, A13..... GENERAL CEMENT #9440

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .01mfd to antenna stator lug of tuning gang. Low side to chassis.	455KC (400∿ Mod.)	(MW) Tuning gang fully closed.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	High side thru 500K to external antenna. Low side to chassis.	525KC	"	"	A5	"
3.	"	1650KC	(MW) Tuning gang fully open.	"	A6	"
4.	"	630KC	630KC	"	A7	"
5.	"	1400KC	1400KC	"	A8	"
6.	"	3.7MC	(SW1) 3.7MC	"	A9	"
7.	"	7.0MC	7.0 MC	"	A10	"
8.	"	4.0MC	4.0MC	"	A11	"
9.	"	6.2MC	6.2MC	"	A12	"
10.	"	5.7MC	(SW2) Tuning gang fully closed.	"	A13	"
11.	"	12.3MC	Tuning gang fully open.	"	A14	"
12.	"	6.2MC	6.2MC	"	A15	"
13.	"	10.0MC	10.0MC	"	A16	Adjust for maximum output. Repeat Steps 2 thru 13.

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	MC102	Mixer				PNP
X2	MC101 ①	Oscillator				PNP
X3	OC44 ②	1st IF Amplifier		2N483	2N412	PNP
X4	OC44 ②	2nd IF Amplifier		2N483	2N412	PNP
X5	OC71	AF Amplifier	2N406	2N362	2N406	PNP
X6	OC71	Driver	2N406	2N362	2N406	PNP
X7	OC72	Output	2N408	2N632	2N408	PNP
X8	OC72	Output	2N408	2N632	2N408	PNP

① Alternate Type MC102.
② Alternate Type MC101.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Jefferson-Travis PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	5	6	C-220	PTT-6005	NLW5-6	TT6X5	ML5-6	TE-1084	
C2	30	3	CD-227	PTT-3030	NLW30-6	TT6X30	ML30-6	TE-1092	
C3	30	3	CD-227	PTT-3030	NLW30-6	TT6X30	ML30-6	TE-1092	
C4	5	6	C-220	PTT-6005	NLW5-6	TT6X5	ML5-6	TE-1084	
C5	30	3	CD-227	PTT-3030	NLW30-6	TT6X30	ML30-6	TE-1092	
C6	5	6	C-220	PTT-6005	NLW5-6	TT6X5	ML5-6	TE-1084	
C7	30	3	CD-227	PTT-3030	NLW30-6	TT6X30	ML30-6	TE-1092	
C8	80	6	CD-237	BCD10080	ECPB117	PET1260	ML100-6	TE-1102	
C9	30	6	C-211	XPP-6030	NLW30-6	TT6X30	ML30-6	TE-1092	

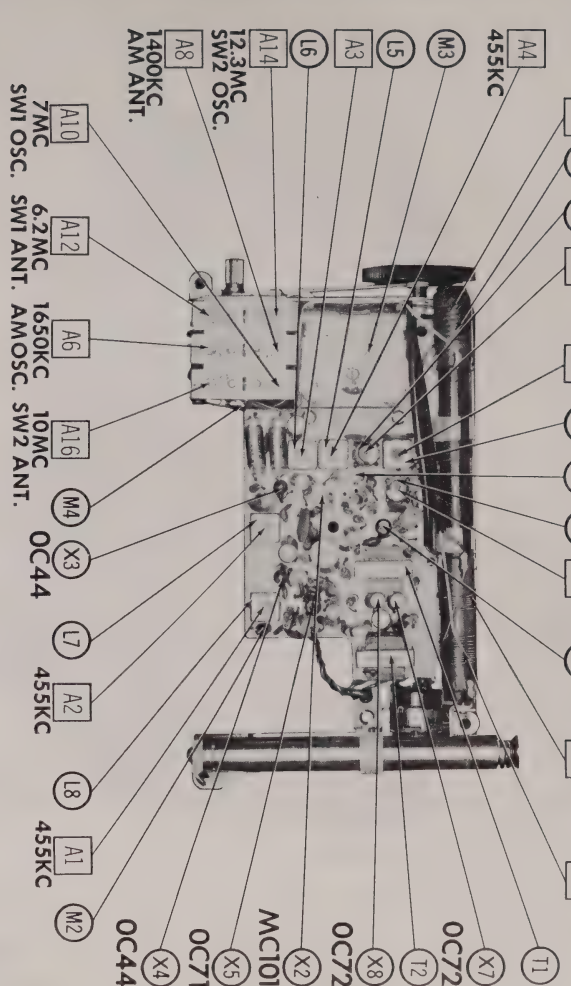
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C10	15		DI-15	DD-150	L10Q15	CCD-150	GP415	10TS-Q15
C11	5		DI-5	DD-050	L10V5	CCD-050	GP550	10TS-V50
C12	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10
C13A								
B								
C		#CD-135						
D								
E								
F								
C14	2000 5%				1R5D2	CM-19B-202J	MCE457	MS-220
C15	15		DI-15	DD-150	L10Q15	CCD-150	GP415	10TS-Q15
C16	40		DI-39	DD-390	L10Q39	CCD-390	GP439	10TS-Q39
C17	.05 200V	#C-337						
C18	1000		BPD-001	DD-103	BYA10D1	CCD-102	B-210	5HK-D10
C19	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C20	230		DI-220	DD-241	L10T24	CCD-221	GP324	10TS-T24
C21	500		DI-500	DD-501	BYA10T5	CCD-501	B-350	10TS-T50
C22	250		DI-250	DD-251	L10T25	CCD-251	GP325	10TS-T25
C23	10		DI-10	DD-100	L10Q10	CCD-100	GP410	10TS-Q10
C24	3200 5%				1R5D33	CM-20B-332J		MS-233
C25	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C26	25		DI-25	DD-250	L10Q25	CCD-250	GP425	10TS-Q25
C27	2500 5%				1R5D25	CM-20B-252J		MS-225
C28	10		DI-10	DD-100	L10Q10	CCD-100	GP410	10TS-Q10
C29	.05 200V	#C-337						
C30	5		DI-5	DD-050	L10V5	CCD-050	GP550	10TS-V50
C31	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10
C32	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10
C33	2000		DI-2000	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C34	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C35	.05 200V	#C-337						
C36	50000		C80V503AM	DA-503	H-05S5		TA-150	TG-S50

Jefferson-Travis Part Number.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					* INSTALLATION NOTES
	RESISTANCE	WATTS	Jefferson-Travis PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/4	RD-117					Volume & Switch

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Jefferson-Travis PART No.	QUAM PART No.	
SP1	3"	PM	6-8Ω	SP8-03		

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R2	33K			
R3	10K			
R4	2200Ω			
R5	47K			
R6	47K			
R7	10K			
R8	1000Ω			
R9	220K			
R10	6800Ω			
R11	1000Ω			
R12	100Ω			
R13	100K			
R14	3300Ω			
R15	6800Ω			
R16	33K			
R17	10K			
R18	820Ω			

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R19	1000Ω			
R20	47K			
R21	10K			
R22	3900Ω			
R23	1000Ω			
R24	3300Ω			
R25	22K			
R26	5600Ω			
R27	1000Ω			
R28	100Ω			
R29	220Ω			
R30	3900Ω			
R31	Temp. Comp.			Pt. #S250
R32	5.0Ω			Pt. #RD-229B
R33	100Ω			
R34	3900Ω			

BATTERIES

ITEM No.	VOLTAGE	Jefferson-Travis PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V	*		930 *		1015 *		M-15R *	* 4 Required

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Jefferson-Travis PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	OA70			1N60	1N60	Detector (Pigtail)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		Jefferson-Travis PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	
L1A	SW1 Loopstick					
B	SW2 Loopstick	LT-182K ①				
C	BC Loopstick					
L2	SW1 Osc.	LT-256 ②				
L3	SW2 Osc.	LT-255 ③				
L4	BC Osc.	LT-216				
L5	1st IF	LT-338				
L6	2nd IF	LT-338				
L7	3rd IF	LT-321				
L8	4th IF	LT-322				

① Part #LT-177K used in Model JT-H105S.
② Part #LT-252 used in Model JT-H105S.
③ Part #LT-251 used in Model JT-H105S.

MISCELLANEOUS

ITEM No.	PART NAME	Jefferson-Travis PART No.	NOTES
M3	Tuning Cap.	CD-134	2 Gang
M4	Switch	SD-115	Function (Rotary Type)
M5	Antenna	MD-2139	Rod Type

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Jefferson-Travis PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2	1	LT-511		TA-36			

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Jefferson-Travis PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	1000Ω CT	6-8Ω	LT-438		TA-25 ①			① Use 8Ω Secondary Tap.

PHOTOFACT® Folder

PACEMAKER
MODEL PM 33

PACEMAKER
MODEL PM 33

PACEMAKER
MODEL PM 33

TRADE NAME	Pacemaker Model PM33
MANUFACTURER	Bell Sound Div., Thompson Ramo Wooldridge Inc., 555 Marion Road, Columbus 7, Ohio
TYPE SET	AC Operated 6 Tube Audio Amplifier (Some versions may have a manual record player cabinet top)
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 110 Watts, 1 Amp. @ 117 Volts AC

SET 523 FOLDER 8

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of KX305

the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1961 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
	• GENERAL ELECTRIC •			• RAYTHEON • SYLVANIA •	
V1	Microphone Preamp.	6SC7	V4	Output	6L6GC
V2	AF Amplifier	6AV6	V5	Output	6L6GC
V3	AF Amp. -Phase Inv.	ECC83/12AX7	V6	Rectifier	5U4GB

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA PACEMAKER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	40	450	B-20053P153			TCT3764		TVAS-4730 *	
B	15	450				TC3501			
C	10	450							
D	100	50							
C2	150	15	B-20053P155	PRS1370	BR1505	TC25015	TD-150-50	TVA-1311	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

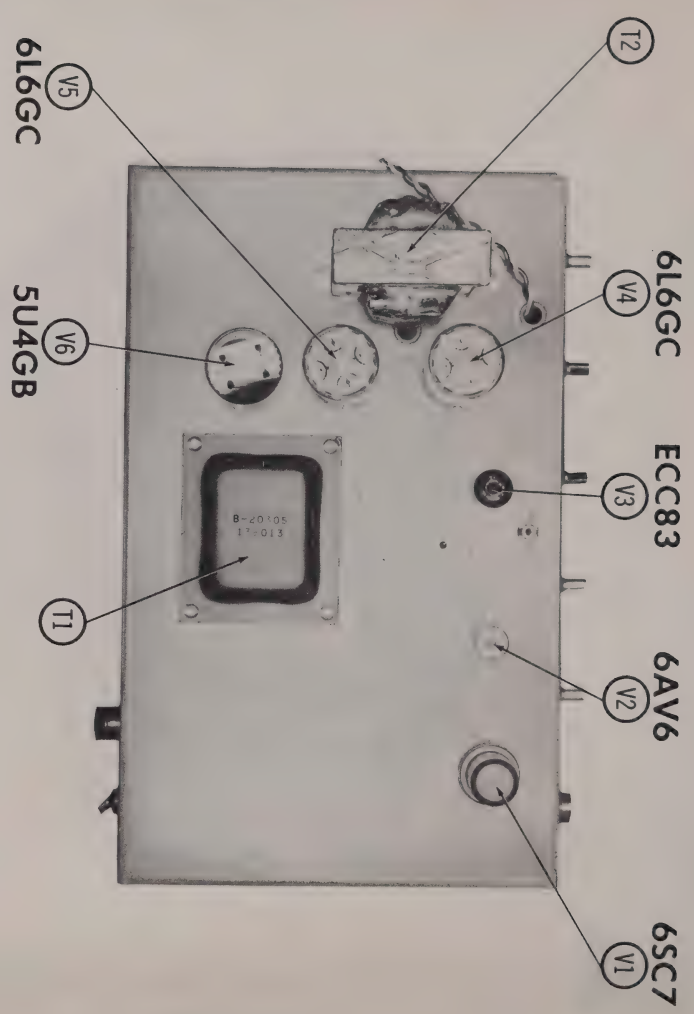
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C4	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C6	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C7	150		1467-00015	DD-151	5W5T15	CM-20B-151M	MC236	1FM-315
C8	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C9	470		1467-00047	DD-471	5W5T47	CM-20B-471M		1FM-347
C10	.005 400V		P488N-005	D6-502	CUB6D5	6DP-1-502	GEM-625	6TM-D50
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C12	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C13	.001 1600V		P1684CM-001	DD30-102	CUB16D1	16DP-2-102	GEM-1621	MB-D1
C14	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PACEMAKER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1meg	½	B20066P140	B-70	A47-1meg-Z	Q13-137	U53	Mic. 1 Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	1meg	½	B20066P140	B-70	A47-1meg-Z	Q13-137	U53	Mic. 2 Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	1meg	½	B20066P140	B-70	A47-1meg-Z	Q13-137	U53	Phono Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R4A	100Ω	2(WW)	B20066P141	WN-101	A43-100	WPK100	R100L	Hum Balance
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (IRC or EQUIVALENT)

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R5	4.7meg	
R6	470K	
R7	4.7meg	
R8	470K	
R9	390K	
R10	100K	
R11	100K	
R12	470K	
R13	2700Ω	
R14	68K	

ITEM No.	RATING	REMARKS
R15	150K	
R16	47K	
R17	470K	
R18	47K	
R19	270K	
R20	1meg	
R21	1meg	
R22	5600Ω	
R23	39K	
R24	270Ω	

ITEM No.	RATING	REMARKS
R25	1meg	
R26	270K	
R27	5600Ω	
R28	270K	
R29	270K	
R30	270K	
R31	250Ω 5W	IRC#PW5-250Ω
R32	4000Ω 7W	IRC#PW10-4000Ω
R33	40K 10W	IRC#PW10-40000Ω
R34	27K	

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	PACEMAKER PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	117V @ 1A	780VCT @ .130A DC	5V @ 3A	B-20305					
	SEC. 3	SEC. 4	SEC. 5						
	6.3V @ 3A								

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	PACEMAKER PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	6500Ω CT	152Ω (70V) Tap @ 16Ω, 8Ω, 4Ω	B20320					

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			PACEMAKER PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	2A 125V S/B	B-20043P30	B-20001P13	313002 (3AG 2A 125V) S/B	342001	MDL 2	HKP

MISCELLANEOUS

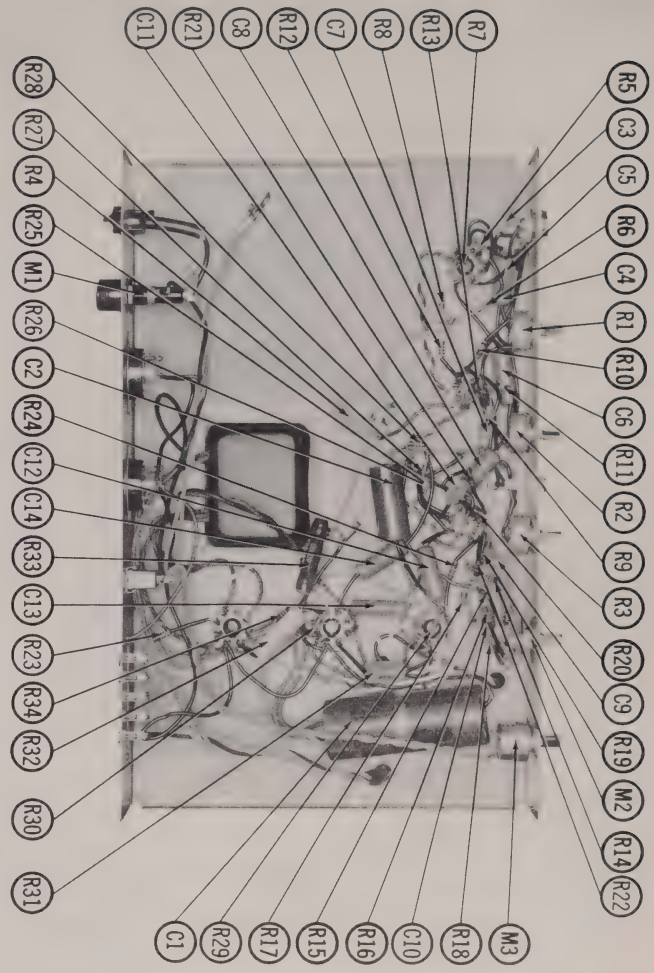
ITEM No.	PART NAME	PACEMAKER PART No.	NOTES
M2	Switch	B-20033P8	Acoustic Control (Rotary Wafer)
M3	Switch	B-20105P20	Off-On (Rotary Snap Toggle)

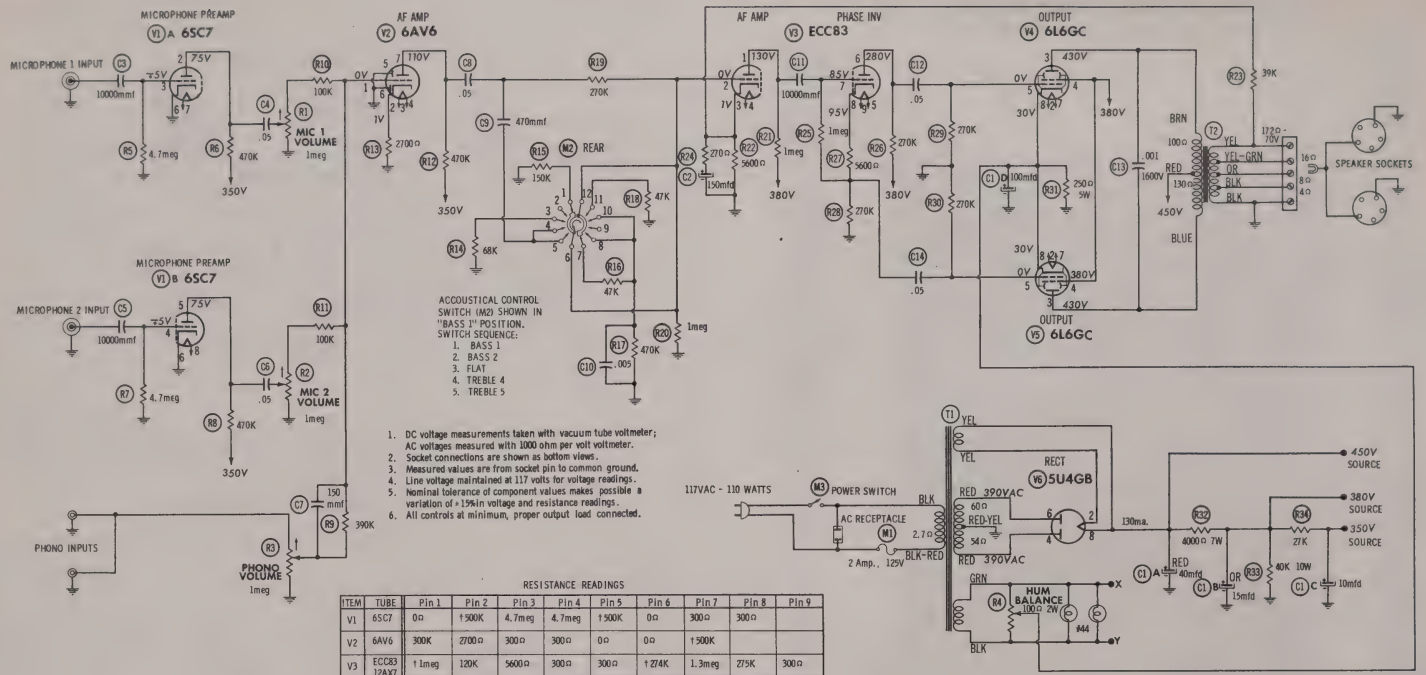
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	84A31	
Handle	13A0132	

CHASSIS—BOTTOM VIEW





1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6SC7	0Ω	†500K	4.7meg	4.7meg	†500K	0Ω	300Ω	300Ω	
V2	6AV6	300K	2700Ω	300Ω	300Ω	0Ω	0Ω	†500K		
V3	ECC83 12AX7	†1meg	120K	5600Ω	300Ω	300Ω	†274K	1.3meg	275K	300Ω
V4	6L6GC	TP	300Ω	†100Ω	†4000Ω	270K	TP	300Ω	250Ω	
V5	6L6GC	TP	300Ω	†130Ω	†4000Ω	270K	TP	300Ω	250Ω	
V6	5U4GB	TP	¶	TP	54Ω	NC	60Ω	TP	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 8 OF V6. NC NO CONNECTION TP TIE POINT

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PACEMAKER MODEL PM 33

PHOTOFACT® Folder with CIRCUITRACE®

**PHILCO MODELS
T-52-124, TC-57**

PHILCO MODELS
T-52-124, TC-57

MODEL T-52-124

PHILCO MODELS
T-52-124, TC-57

TRADE NAME	Philco Model T-52-124, TC-57B, TC-57CP
MANUFACTURER	Philco Corp., Tioga & C Streets, Philadelphia, Pa.
TYPE SET	Battery Operated Transistorized Portable AM Receiver (Model TC-57 Series Are Clock Versions)
POWER SUPPLY	6 Volts DC RATING 8MA@6 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	535 – 1620KC 10MA@6 Volts DC(Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
A1, A2, A3.... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8729, 8987, 8988, 8989
WALSCO #2515, 2531, 2532
A4.....GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A5, A6.....GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to Antenna stator lug of tuning gang. Low side to chassis.	455KC (400∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Adjust for maximum output.
2.	Loop	600KC	600KC	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	1620KC	Tuning gang fully open.	"	A5	"
4.	"	1400KC	1400KC Signal.	"	A6	Adjust for maximum output. Repeat Steps 2, 3, and 4.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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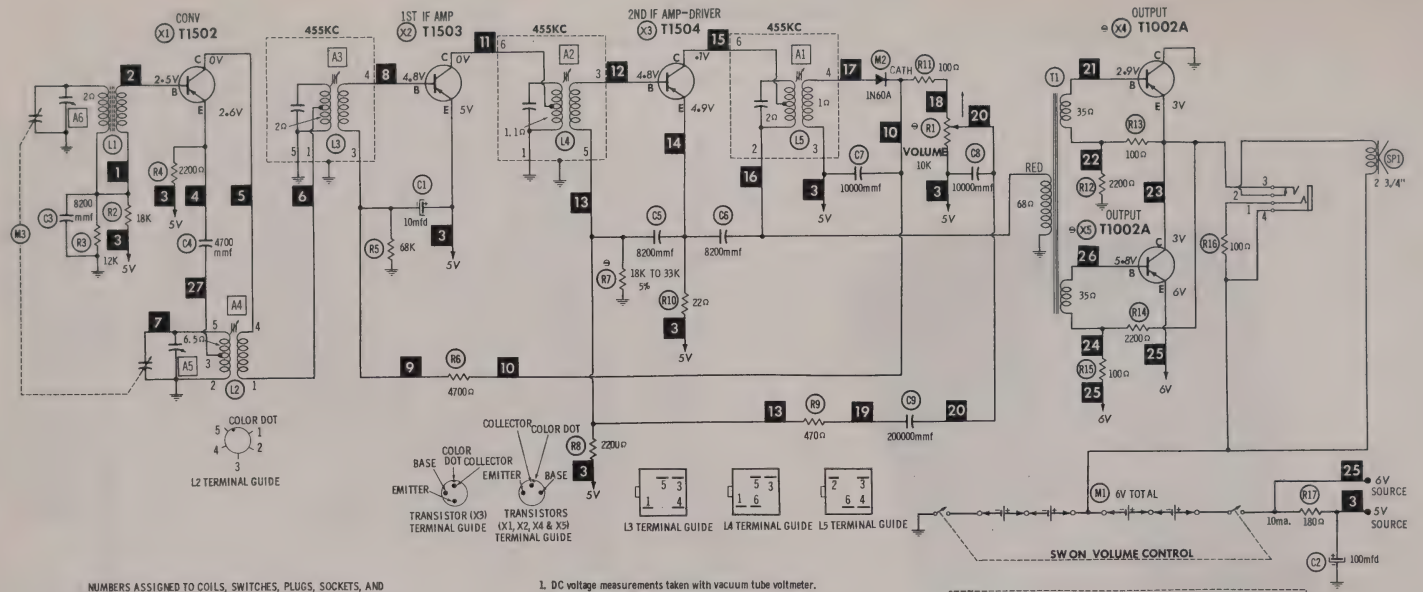
KF271

SET 523 FOLDER 9



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

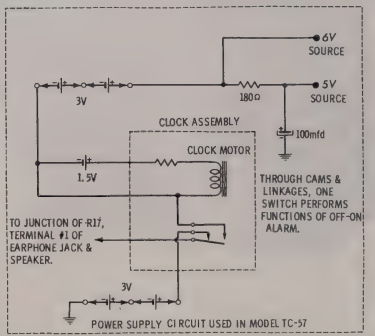
RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.



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PHILCO MODELS T-52-124, TC-57

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA: RCA PART No.	REPLACEMENT DATA: RAYTHEON PART No.	REPLACEMENT DATA: SYLVANIA PART No.	NOTES
X1	T-1502	Converter				PNP
X2	T-1503	1st IF Amplifier				PNP
X3	T-1504	2nd IF Amp. -Driver				PNP
X4	T-1002A*	Output	2N270	2N632		PNP \ Matched
X5	T-1002A*	Output	2N270	2N632		PNP / Pair

* Alternate Type T-1549.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	10	6	30-2591-9	PTT-6010	NLW10-6	TT6X10	ML10-6	TE-1087	
C2	100	6	30-2588-4	SRE6V100	NLW100-12	TT6X100	ML100-6	TE-1102	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	8200			DD-822		CCD-822	B-282	
C4	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	10TS-D47
C5	8200			DD-822		CCD-822	B-282	
C6	8200			DD-822		CCD-822	B-282	
C7	10000		BPD-01	DD-103	H-05S1	CCD-103	B-110	5HK-S10
C8	10000		BPD-01	DD-103	H-05S1	CCD-103	B-110	5HK-S10
C9	200000	#30-1279-3		UK10-204				

Philco Part Number.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	10K	1/4	33-5583-17					Volume & Switch (Note 1)

Note 1. Model TC-57 uses Part #33-5583-19 (Less Switch).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: WORKMAN TV PART No.	REMARKS
R2	18K			
R3	12K			
R4	2200Ω			
R5	68K			
R6	4700Ω			Note 1
R7				
R8	2200Ω			
R9	470Ω			

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: WORKMAN TV PART No.	REMARKS
R10	22Ω			
R11	100Ω			
R12	2200Ω			
R13	100Ω			
R14	2200Ω			
R15	100Ω			
R16	100Ω			
R17	180Ω			

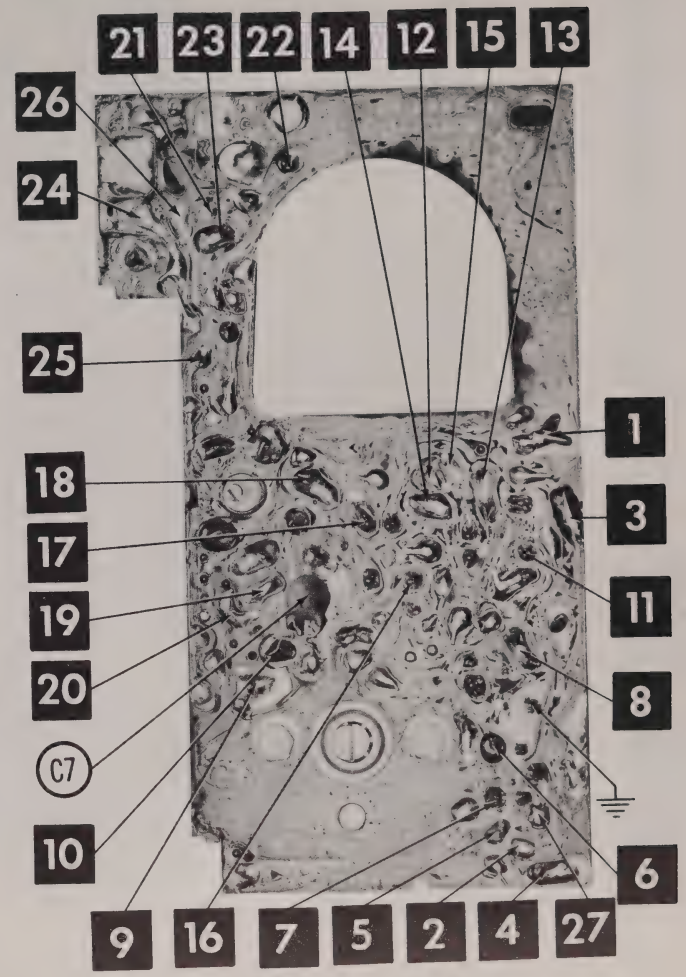
Note 1. Value varies between 18K and 33K. Select that value which allows X3 collector to draw 2MA.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: Merit PART No.	REPLACEMENT DATA: Miller PART No.	REPLACEMENT DATA: Stancor PART No.	NOTES
L1	Loopstick	32-4761-2		2003		
L2	Osc.	32-4669-7				
L3	1st IF	32-4708-12				
L4	2nd IF	32-4708-13				
L5	3rd IF	32-4708-14				

PRINTED BOARD

A Howard W. Sams CIRCUITRACE® Photo



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO PRI.	TURNS RATIO SEC.	REPLACEMENT DATA PHILCO PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2	1 SEC. 2 1	32-8838-3					

SPEAKER

ITEM No.	TYPE SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA PHILCO PART No.	QUAM PART No.	NOTES
SP1	2 3/4"	PM	95-100Ω	36-1664-8		

BATTERIES

ITEM No.	VOLTAGE	PHILCO PART No.	REPLACEMENT DATA BURGESS "A"	BURGESS "B"	EVEREADY "A"	EVEREADY "B"	MALLORY "A"	MALLORY "B"	NOTES
M1	1.5V	P-15 *		930 *		1015 *		M-15R *	* 4 Required (Radio)
	1.5V	P-920 †		230 †		A100 †		M-13R †	† 1 Required (Clock)

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA PHILCO PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M2	1N60A	34-8022-3		1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M3	Tuning Cap.	31-2788-2	2 Gang
	Printed Board	54-6962-2	
	Timer Ass'y.	41-2073-3	Model TC-57

CABINETS & CABINET PARTS

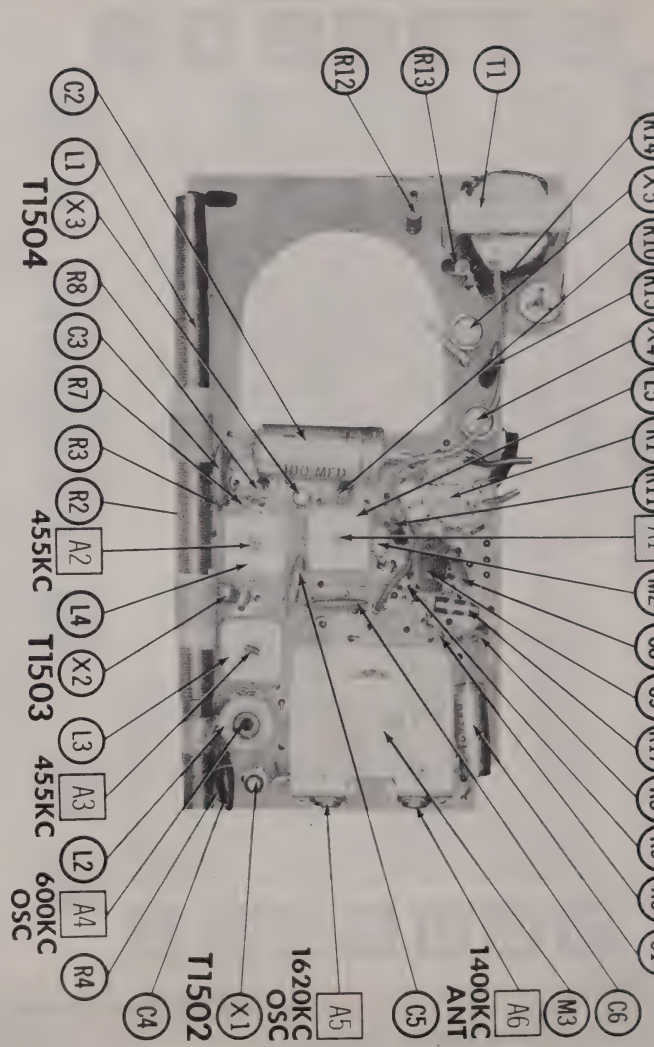
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	424-8087	Tuning (Charcoal) Model T-52-124
Knob	424-8098	Tuning (Ivory) Model T-52-124
Knob	424-8099	Tuning (Terracotta) Model T-52-124
Knob	54-6624-16	Tuning, Model TC-57
Knob	54-6660-3	Volume, Model T-52-124
Knob	54-6660-2	Volume, Model TC-57
Knob	54-5428-3	Clock, Model TC-57
Cabinet	424-8088	Charcoal, Model T-52-124
Cabinet	424-8095	Ivory, Model T-52-124
Cabinet	424-8096	Terracotta, Model T-52-124
Cabinet Front	54-6979-3	Model TC-57
Cabinet Back	54-5688-1	Charcoal, Model T-52-124
Cabinet Back	54-5688-2	Ivory, Model T-52-124
Cabinet Back	54-5688-4	Terracotta, Model T-52-124
Cabinet Back	51-0056-5	Brown, Model TC-57B
Cabinet Back	51-0056-6	Champagne, Model TC-57CP
Crystal	54-5425	Clock, Model TC-57

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



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RCA VICTOR MODEL VP-38 (Ch. RS-175B)

RCA VICTOR MODEL
VP-38 (Ch. RS-175B)

RCA VICTOR MODEL
VP-38 (Ch. RS-175B)

TRADE NAME	RCA Victor Model VP-38 (Ch. RS-175B)
MANUFACTURER	RCA Victor Radio & "Victrola" Div., Radio Corp. of America, Camden 8, N. J.
TYPE SET	AC Operated 3 Tube Stereo Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	110 - 120 Volts AC, 60 Cycles RATING 28 Watts, .32 Amp. @117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER — SEE RCA RP-212-2 — PHOTOFACT SET 475 FOLDER 7

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES

• GENERAL ELECTRIC •			RAYTHEON • SYLVANIA •		
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Left Channel AF Amp. - Right Channel AF Amp.	12AX7	V2 V3	Left Channel Output Right Channel Output	50EH5 50EH5

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	RCA VICTOR PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	80	150	102019	PRS2220	BBRD8415	TCT3116	TDLD-10	TVAS-2459 *	
B	20	150							
C2	160	10NP	108963	PRS7340	BR15015			TVANS-1120 *	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C4	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C5	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47
C6	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C8	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C10	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	RCA VICTOR PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	5meg	1/2	106969	B-88	AD47-5meg-S		FA56A	Volume, Left Channel
B	5meg	1/2		SR-88	Not Req.		RU56A	Volume, Right Channel
C	Shaft			Not Req.	KSS-3		CS3500	
R2A	2meg	1/2	106968	B-76	AD47-2meg-S		FA26A	Tone, Left Channel
B	2meg	1/2		SR-76	Not Req.		RU26A	Tone, Right Channel
C	Shaft			Not Req.	KSS-3		CS3500	
R3A	500K	1/2	108972	B-59	A47-500K-S	Q11-133	U50	Balance
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

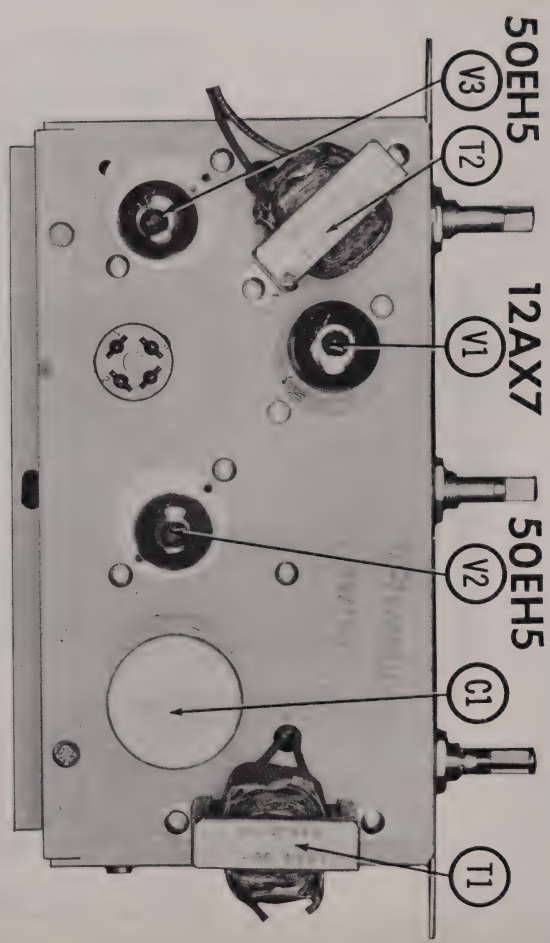
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		REMARKS
		IRC PART No.	WORKMAN TV PART No.	
R4	10meg			
R5	270K			
R6	68Ω			
R7	10meg			

ITEM No.	RATING	REPLACEMENT DATA		REMARKS
		IRC PART No.	WORKMAN TV PART No.	
R8	270K			
R9	68Ω			
R10	4700Ω 1W			
R11	10Ω 7W	PW10-10Ω	7W-SQ-9Ω	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		RCA VICTOR PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	
L1	Tone Choke(2MH)	108973	BC-514	4666	RTC-9175	
L2	Tone Choke(2MH)	108973	BC-514	4666	RTC-9175	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	RCA VICTOR PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	3100Ω	3-4Ω	108974	A-3025	A-3332	24S53	S-16X	
T2	3100Ω	3-4Ω	108974	A-3025	A-3332	24S53	S-16X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	RCA VICTOR PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	107474	4A1	
SP2	4"	PM	3-4Ω	79696B	4A05	
SP3	4"	PM	3-4Ω	107474	4A1	

POWER RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	RCA VICTOR PART No.	RCA PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.065A	108680 *	1N1763 *	2F4 *	SR200 *	* Silicon

PHONO CARTRIDGE & NEEDLES

*NEEDLE LISTINGS SHOWN ARE FOR RESPECTIVE REPLACEMENT CARTRIDGES ONLY.

ITEM No.	REPLACEMENT DATA								NOTES
	RCA VICTOR PART No.		ASTATIC PART No.		ELECTRO-VOICE PART No.		SONOTONE PART No.		
	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	
M2	108213A	108214 *	13TB	Not Req.	26S	S1-1 * & S3-3 *	8TA4-S	N-8TA-S *	

MISCELLANEOUS

ITEM No.	PART NAME	RCA VICTOR PART No.	NOTES
M3	Switch	108457	Off-On (On Motor Board)

CABINETS & CABINET PARTS

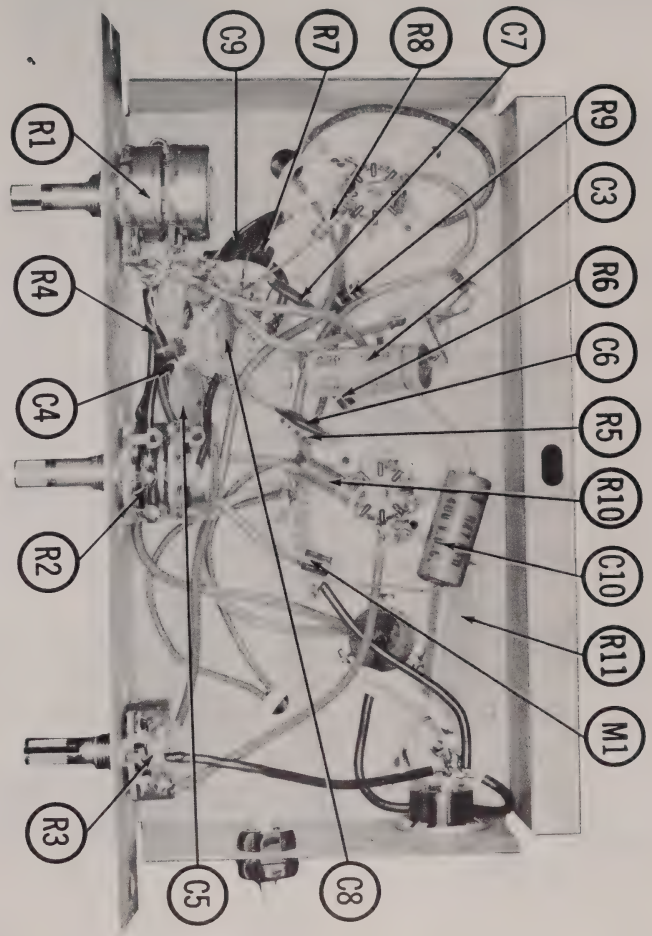
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

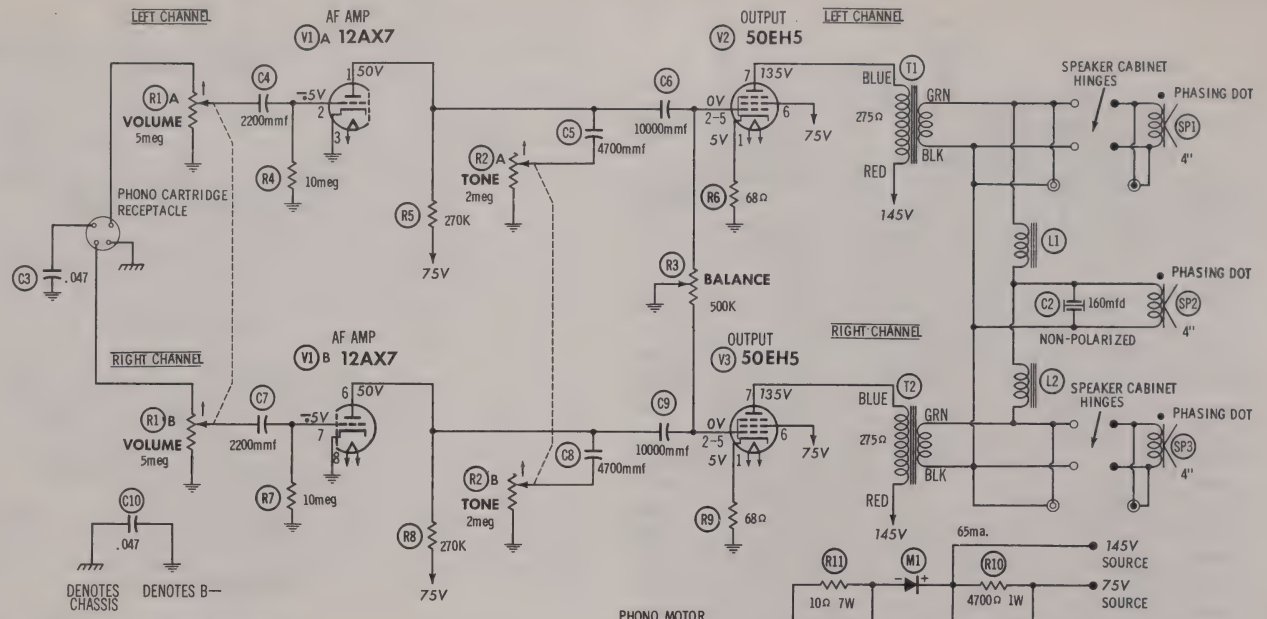
NAME	PART NO.	DESCRIPTION
Knob	108982	
Cabinet	X4727	Charcoal, Includes Speaker Cabinets
Handle	108986	Charcoal, Gray

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting) .....Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)

CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†275K	10meg	0Ω	0Ω	15Ω	†275K	10meg	0Ω	NC
V2	50EH5	68Ω	250K	15Ω	85Ω	250K	†4700Ω	†275Ω		
V3	50EH5	68Ω	250K	85Ω	150Ω	NC	†4700Ω	†275Ω		

† MEASURED FROM OUTPUT OF M1. NC NO CONNECTION

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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RCA VICTOR MODEL VP-38 (Ch. RS-175B)

PHOTOFACT® Folder

SYMPHONIC MODELS 1625, 1641, 1644, 1646, 1647, 1648

SYMPHONIC MODELS 1625, 1641, 1644, 1646, 1647, 1648

MODEL 1625

SYMPHONIC MODELS 1625, 1641, 1644, 1646, 1647, 1648

TRADE NAME	Symphonic Models 1625, 1641, 1644, 1646, 1647, 1648
MANUFACTURER	Symphonic Radio & Electronics, 235 Jersey Ave., New Brunswick, N. J.
TYPE SET	AC Operated 4 Tube Stereo Phono Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	110 - 120 Volts AC, 60 Cycles RATING 60 Watts, .58 Amp. @117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER USED IN MODELS 1625, 1646, 1647, 1648 — SEE SIMILAR V-M 1201 — PHOTOFACT SET 436 FOLDER 18 OR RECORD CHANGER MANUAL RC-12

FOR SERVICE INFORMATION ON RECORD CHANGER USED IN MODEL 1641 — SEE SIMILAR MONARCH UA8 — PHOTOFACT SET 381 FOLDER 11 OR RECORD CHANGER MANUAL RC-11

FOR SERVICE INFORMATION ON RECORD CHANGER USED IN MODEL 1644 — SEE SIMILAR TELEFUNKEN TW560 — PHOTOFACT SET 371 FOLDER 12 OR RECORD CHANGER MANUAL RC-10

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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KT177

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE
V1	Channel A AF Amp. - Channel B AF Amp.	ECC83/12AX7
V2	Channel A Output	EL84 (6BQ5) *
V3	Channel B Output	EL84 (6BQ5) *
V4	Rectifier	EZ81/6CA4

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA SYMPHONIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲60	400	CE-136		C1080	FP369.1	TMQ-4370	TVL-3744.2	
B	■40	350			BR5045	TC795	TD-50-25	TVA-1714	
C	▲40	300							
D	50	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C3	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C4	.25 200V		P288N-25		CUB2P25	2DP-4-254	GEM-2025	2TM-P25
C5	.05 200V		P288N-05	DD-503	CUB2S5	4DP-3-503	GEM-415	2TM-S50
C6	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C7	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C8	.25 200V		P288N-25		CUB2P25	2DP-4-254	GEM-2025	2TM-P25
C9	.05 200V		P288N-05	DD-503	CUB2S5	4DP-3-503	GEM-415	2TM-S50
C10	.47 200V		P288N-47		CUB2P47	2DP-5-474	GEM-20 7	2TM-P47
C11	.47 200V		P288N-47		CUB2P47	2DP-5-474	GEM-2047	2TM-P47

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SYMPHONIC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	3meg		VC-198	B-85	A47-3meg-Z	Q13-140	U57	Loudness, Channel A
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R2A	3meg		VC-198	B-85	A47-3meg-Z	Q13-140	U57	Loudness, Channel B
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R3A	500K		VC-270	B-60	AD47-500K-Z		FA55A	Treble, Channel B
B	500K			SR-60	Not Req.		RU55A	Treble, Channel A
C	Shaft			Not Req.	KSS-3		CS3500	
R4A	3meg		VC-269	B-85			FC36A	Bass, Channel B
B	3meg			SR-85			RU36A	Bass, Channel A
C	Shaft			Not Req.			CS3500	

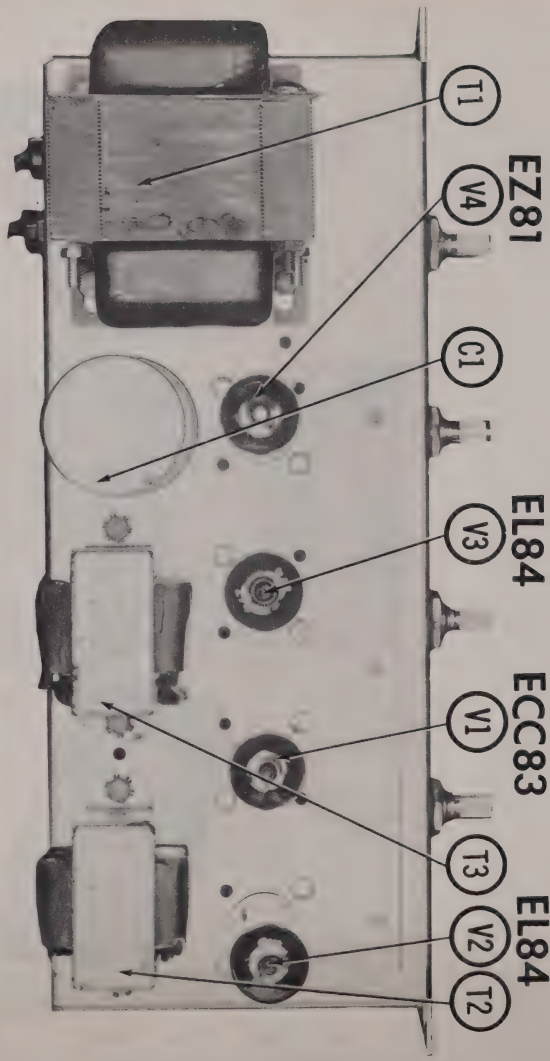
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R5	100K			
R6	6.8meg			
R7	270Ω			
R8	680Ω			
R9	5600Ω			
R10	1000Ω			
R11	82Ω 3W	PW5-82Ω	5W-SQ-82Ω	
R12	100K			

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R13	6.8meg			
R14	680Ω			
R15	5600Ω			
R16	270Ω			
R17	1000Ω			
R18	1200Ω 1W			
R19	270Ω 5W	PW5-270Ω	5W-SQ-270Ω	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	SYMPHONIC PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	117V ⓐ .58A	500VCT ⓐ .090A	6.3V ⓐ 2.8A	TR-180	P-3148①	PC-8404 ① ②	24Ri3U ①②③	R-110A ①②③	① Drill New Mounting Holes. ② Tape 5V Winding. ③ Tape Center Tap On 6.3V Winding.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	SYMPHONIC PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5400Ω	3-4Ω	TR-184①	A-3019	A-8092	26S49	S-5Z	①Part #TR-178 used in Model 1646. Part #TR-187 used in Model 1648.
T3	5400Ω	3-4Ω	TR-184①	A-3019	A-8092	26S49	S-5Z	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	SYMPHONIC PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	SP-600①	6A31	① Model 1625
SP2	3½"	PM	3-4Ω	SP-420②	3A15TZ3.2	② Models 1625, 1644, 1647
SP3	3½"	PM	3-4Ω	SP-420②	3A15TZ3.2	③ Model 1648
SP4	6"	PM	3-4Ω	SP-600①	6A31	④ Models 1646, 1647
SP5	3½"	PM	3-4Ω	SP-420②	3A15TZ3.2	⑤ Model 1641
SP6	3½"	PM	3-4Ω	SP-420②	3A15TZ3.2	⑥ Model 1644
	12"	PM	3-4Ω	SP-808③	12A6A	⑦ Models 1646, 1648
	10"	PM	3-4Ω	SP-805④	10A4A	
	6"x 9"	PM	3-4Ω	SP-617⑤		
	6"x 9"	PM	3-4Ω	SP-619⑥		
	2½"	PM	3-4Ω	SP-202⑦		

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	SYMPHONIC PART No.	REPLACEMENT DATA	
K1	Audio Coupling	250mmf, 10000mmf, 250K, 500K		Aerovox	PA-112-4
				Centralab	PC-81
				Cornell-Dubilier	113TM2
				Sprague	T-2
K2	Audio Coupling	250mmf, 10000mmf, 250K, 500K		Aerovox	PA-112-4
				Centralab	PC-81
				Cornell-Dubilier	113TM2
				Sprague	T-2

PHONO CARTRIDGE & NEEDLES

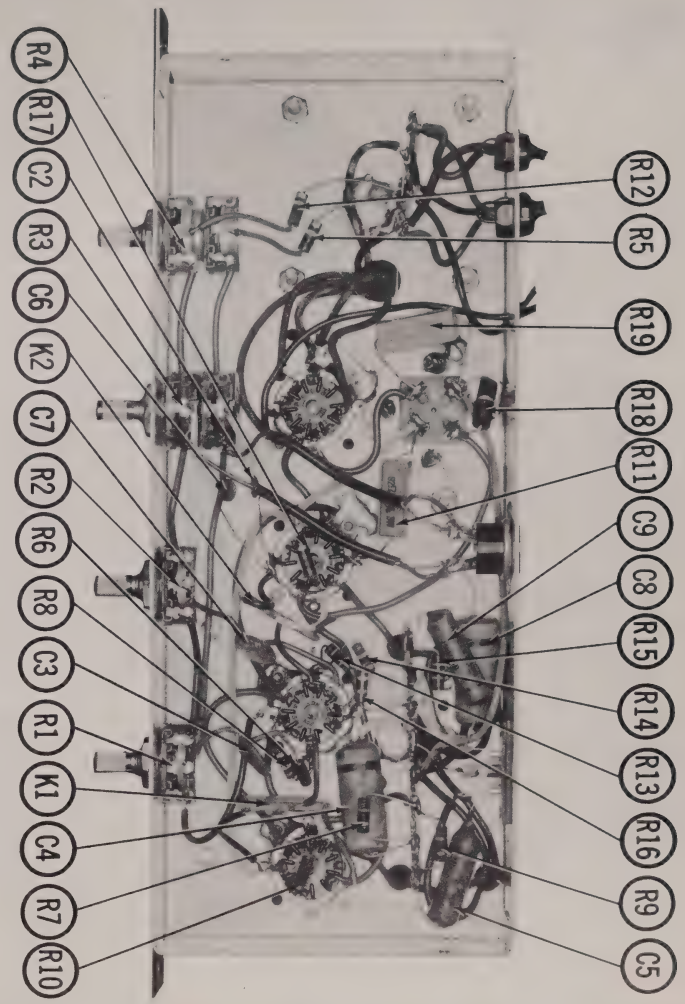
*NEEDLE LISTINGS SHOWN ARE FOR RESPECTIVE REPLACEMENT CARTRIDGES ONLY.

ITEM No.	REPLACEMENT DATA								NOTES
	SYMPHONIC PART No.		ASTATIC PART No.		ELECTRO-VOICE PART No.		SONOTONE PART No.		
	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	
M1			80TS-TB	Not Req.			10T2-S	Not Req.	

WIRING DATA

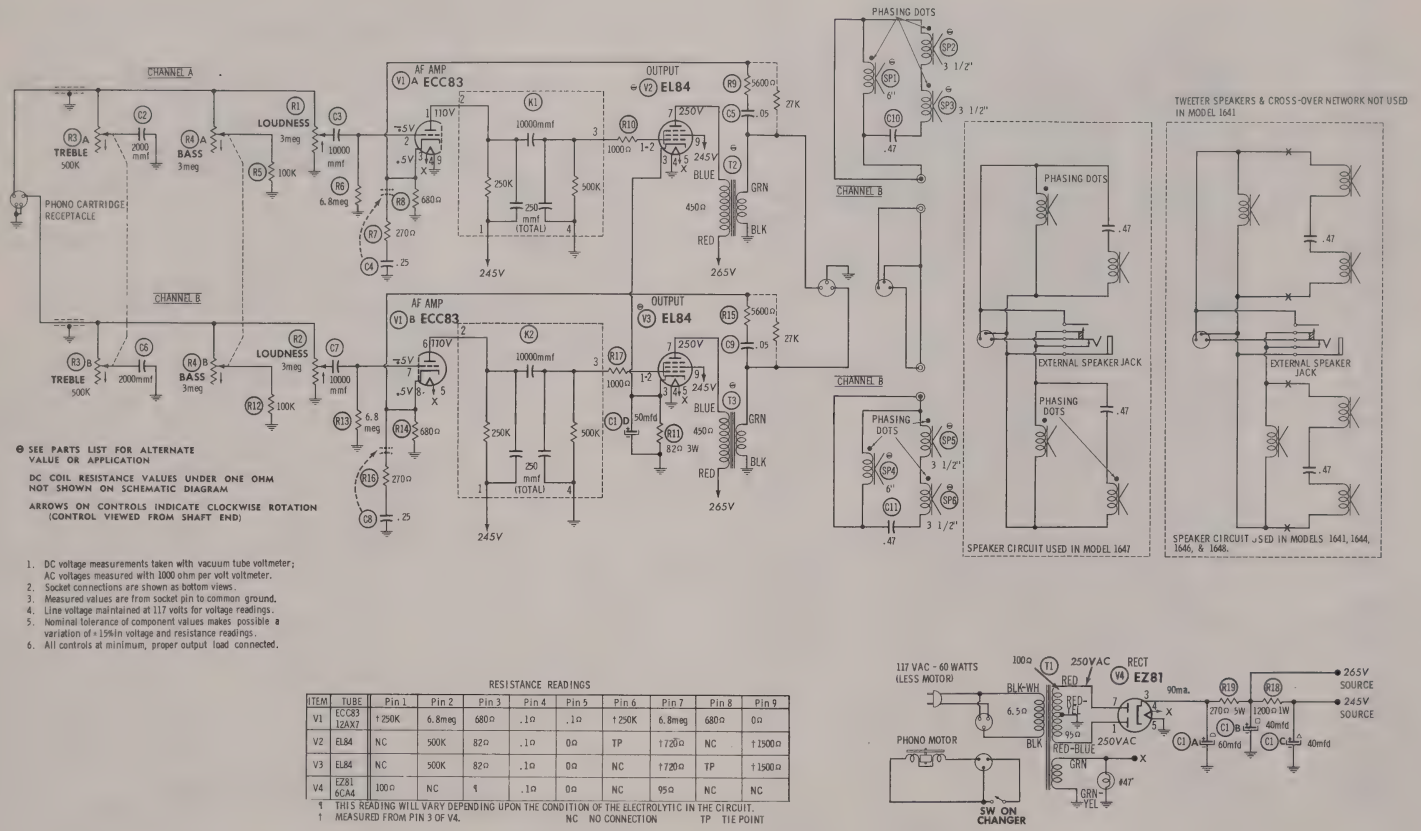
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

CHASSIS—BOTTOM VIEW



SYMPHONIC MODELS 1625, 1641, 1644, 1646, 1647, 1648

FOLDER 11



⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 12AX7	†250K	6.8meg	680Ω	.1Ω	.1Ω	†250K	6.8meg	680Ω	0Ω
V2	EL84	NC	500K	82Ω	.1Ω	0Ω	TP	††20Ω	NC	†1500Ω
V3	EL84	NC	500K	82Ω	.1Ω	0Ω	NC	††20Ω	TP	†1500Ω
V4	EZ81 6CA4	100Ω	NC	¶	.1Ω	0Ω	NC	95Ω	NC	NC

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 3 OF V4. NC NO CONNECTION TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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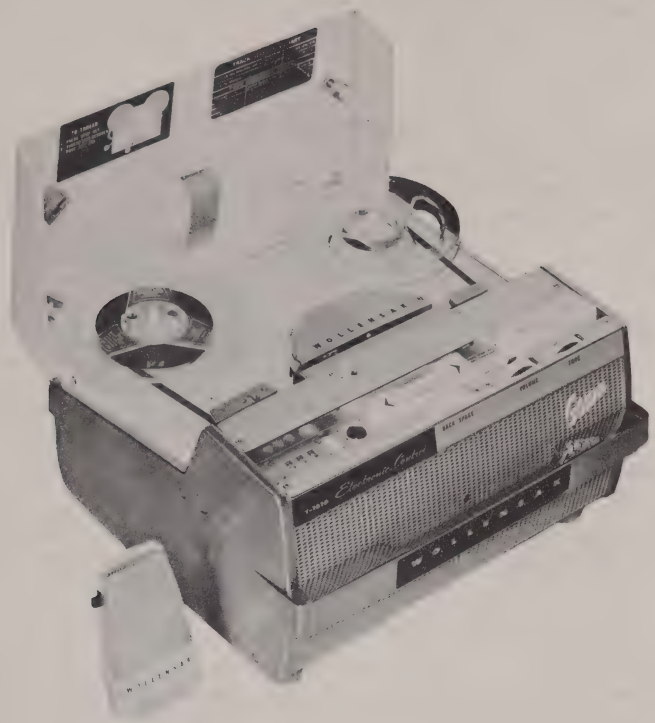
SYMPHONIC MODELS 1625, 1641, 1644, 1646, 1647, 1648

PHOTOFACT® Folder

WOLLENSAK MODELS T-1600,
T-1616, T-1800, T-1818

WOLLENSAK MODELS T-1600,
T-1616, T-1800, T-1818



GENERAL INFORMATION

Wollensak Models T-1600, T-1616, T-1800, and T-1818 recorders are, in major respect, all basically alike in design and operation. However, some minor differences between models do exist (See "Description of Models"). The various functions of the recorder are electro-mechanically controlled by depressing the desired function key.

Automatic end of tape cutoff, automatic rewind, and automatic replay are incorporated in these models.

Recordings may be made from a radio, phonograph, and TV set as well as those made directly from the microphone.

These recorders are to be connected to a 60 cycle, 110-120 volts AC power supply.

Manufactured By:

Wollensak Optical Company
320 East Twenty-First Street
Chicago 16, Illinois

WOLLENSAK MODELS T-1600,
T-1616, T-1800, T-1818

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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CQ464

DESCRIPTION OF MODELS

All models in the T-1600 and T-1800 series are dual speed recorders which operate at 3 3/4 or 7 1/2 inches per second. The main differences between models are as follows:

Model T-1600

Monaural version only – Records and plays monaural, 2(or twin) - track.

Model T-1616

Stereo and monaural versions-

1. Records and plays monaural, 2(or twin) - track.
2. Records and plays monaural , 4 separate tracks.
3. Plays prerecorded stereo,2-track tapes.
4. Plays prerecorded stereo,4-track tapes.

Model T-1800

Same as Model T-1600; also incorporates a remote control socket located on the rear panel which can be used with a foot pedal or desk typewriter for remote operations of the recorder.

Model T-1818

Same as Model T-1616; also incorporates the remote control socket as described and used in Model T-1800.

SPECIFICATIONS

FREQUENCY RESPONSE:
Models T-1600 and T-1800 —
40-15,000 cps ± 3db at 7 1/2 ips.
40-8,000 cps ± 3db at 3 3/4 ips.
Models T-1616 and T-1818 (both channels) —
40-17,000 cps ± 3db at 7 1/2 ips.
40-10,000 cps ± 3db at 3 3/4 ips.

WOW AND FLUTTER:
Less than 0.3% for both speeds.

SIGNAL TO NOISE RATIO:
Greater than 48db.

TAPE SPEEDS:
3 3/4 and 7 1/2 ips (all models).

PLAYING TIME:

All models -- 3 hours with 1 mil tape, 7" reel, at 3 3/4 ips.
(1 1/2 hours each track).
1 1/2 hours with 1 mil tape, 7" reel, at 7 1/2 ips. (3/4 hour each track).
Playing times are 1/3 less with standard 1 1/2 mil tape.

Models T-1616 and T-1818 only -- Provides playing times up to 6 hours for monaural 4-track recordings with a 1 mil tape, 7" reel, at 3 3/4 ips. (1 1/2 hours each track). Playing time 1/3 less with standard 1 1/2 mil tape.

SIGNAL FROM LOWER CHANNEL PREAMP OUTPUT:
Models T-1616 and T-1818 only -- 0.5 to 1.5 volts.

CROSS TALK:
Models T-1616 and T-1818 only — (-50db).

POWER REQUIREMENTS:
105 to 120 volts AC, 60 cycles.

POWER CONSUMPTION:
100 watts.

SIZE:
Approximately 6 1/2" x 10 1/4" x 11 3/4".

WEIGHT:
21 lbs.

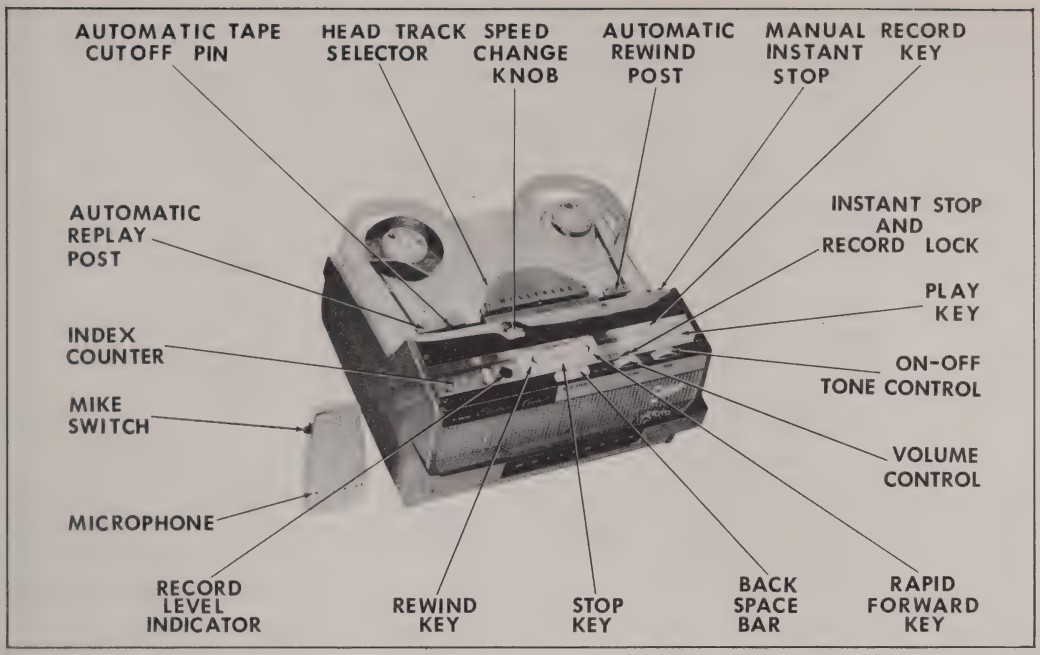

Fig. 1. Tape Recorder Controls - Model T-1616 Shown.

FUNCTION OF PRINCIPAL PARTS (REFER TO FIG. 1)

On-Off Tone Control

Turning the Tone knob to the right supplies power to the entire recorder and simultaneously regulates the one for playback and public address operations only. The tone control is disconnected when recording.

NOTE: The automatic tape cutoff switch is electrically connected in series with the power on-off switch and must be held in the closed position before power is supplied to the recorder. The tape cutoff switch is held in the closed position when either the Stop key is depressed, or when the tape has been threaded on the machine for use in Play, Record, Rewind, or Rapid Forward modes.

Volume Control

Turning the Volume knob to the right regulates the volume for both the recording and playback operations.

Function Keys

All electrical and mechanical functions for Record, Play, Stop, Rapid Forward, and Rewind modes are performed by the function keys.

Stop Key - Depressing the Stop Key stops any prevailing mode of operations and returns the mechanism and associated circuitry to the normal or rest position. With the Stop key in the depressed position, the recorder may be used as a public address system. Depressing the Play, Record, Rapid Forward, or Rewind key selects its respective mode of operation and simultaneously unlatches the Stop key.

Play Key - Depressing the Play key illuminates the key, actuates the mechanism, and switches the electrical circuits necessary to properly play back a recorded tape. Pressing the Play key will not engage the play function if the recorder is engaged in some other function — the Stop key must first be depressed before pressing the Play key.

Record Key - Depressing the Record key illuminates the key, actuates the mechanism, and switches the electrical circuits that enables the material available at the input jack to be recorded. The combination Record Lock - Instant Stop Lever must be pulled back before the Record key can be fully depressed. The Record key, like the Play key, cannot engage its function while the recorder is engaged in another function -- the Stop key must first be depressed before pressing the Record key.

Rapid Forward Key — Depressing the Rapid Forward Key (>) applies power to the rewind solenoid. The solenoid acts upon mechanical linkages in such a way as to cause high speed transport of the tape onto the take-up reel. (See "Mechanical and Electrical Analysis of High Speed Transport of Tape," page 12). The Rapid Forward function can be engaged while the recorder is

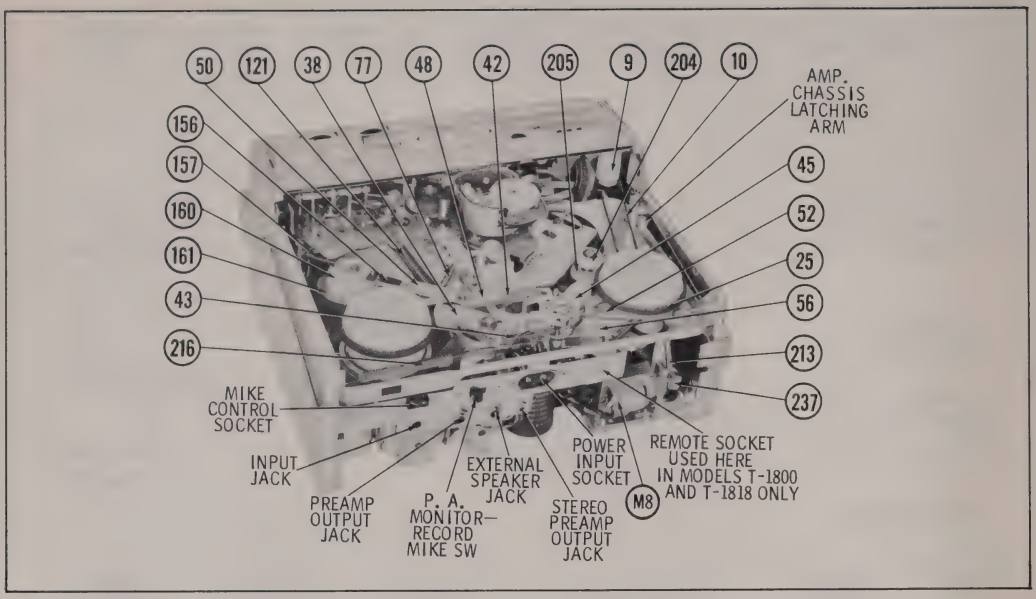

Fig. 2. Rear Panel Connections - Model T-1616 Shown.

in any function except Rewind. Any previously engaged function automatically releases. To switch from Rewind to Rapid Forward function, the Stop key must first be depressed.

Rewind Key — Depressing the Rewind key (<) also supplies power to the rewind solenoid. The solenoid acts upon mechanical linkages in such a way as to cause rewind of the tape onto the supply reel. (See "Mechanical and Electrical Analysis of High Speed Transport of Tape," page 12). The Rewind function can be engaged while the recorder is in any function, except Rapid Forward. Any previously engaged function automatically releases. To switch from Rapid Forward to Rewind function, the Stop key must first be depressed.

Back Space Bar

Pressing this bar duplicates the function of the Rewind key, but with the following modifications in operation and control:

1. The tape will rewind only while the bar is depressed -- releasing the bar will stop the rewind.

2. If the Back Space bar is depressed while the recorder is in the Play function, the mechanism remains in this function while the tape is rewinding. When the Back Space bar is released, the forward travel and play of the tape continues after a slight delay.

3. If the Back Space bar is depressed while the recorder is in the Record function, the mechanism returns to the Stop function while the tape is rewinding. Upon releasing the Back Space bar, all movement of tape travel ceases.

Automatic Features of Rewind, Replay, and Tape Cutoff

Automatic Rewind -- The automatic rewind is controlled by placing a metallic tab evenly with the bottom edge of the tape (on the dull side), at the point where rewind is desired to begin. The rewind feature may be used in conjunction with the Play and Record functions. The rewind begins when the metal tab passes over the contacts on the rewind post. The metal tab shorts these contacts and causes energization of the rewind solenoid. Energization of the solenoid starts the rewind. The rewind will continue until the end of the tape passes between the replay post and pin, or until the Stop key is depressed. If the automatic rewind feature is not desired, the tab can be removed, the tape can be threaded behind the rewind post, or the tab can be overridden by pressing the Rapid Forward key.

Automatic Replay -- The automatic replay is controlled by placing a metallic tab at the beginning of the tape (on the dull side) and evenly with the top edge. The replay feature will only operate when used in conjunction with a rewind tab, and when the recorder is placed in the Play function. With the tape progressing in automatic rewind, the replay begins when the metal tab passes over the contacts on the replay post. The metal tab shorts these contacts and causes de-energization of the rewind solenoid. Rewind ceases and after a slight delay the forward travel and play of the tape is resumed.

Automatic Tape Cutoff — This feature is controlled by a weighted pin which moves into a recess in the replay post when the tape runs out between the post and pin, while in any function of Play, Record, Rewind, Rapid Forward, or Back Space. Movement of the pin

into the replay post opens the tape cutoff switch which interrupts power to the recorder, and thus turns it off. To turn on the recorder after automatic cutoff, the Stop key must be pressed and the tape rethreaded between the replay post and pin.

NOTE: If both rewind and replay tabs are applied to the tape, the automatic end of the tape cutoff will not occur in functions of Play or Record unless the tape is threaded in back of the rewind post. However, the automatic end of tape cutoff will remain effective in functions of Rapid Forward and Rewind with the tabs applied to the tape and with the tape threaded in the conventional manner.

Manual Instant Stop

Pulling back this lever acts mechanically upon the mechanism to stop the tape travel while in functions of Record or Play. The lever is inoperative in functions of Rapid Forward and Rewind.

Instant Stop and Record Lock

The purpose of this lever is two-fold:

1. With the lever left in its normal or rest position, it acts as a lock and prevents the Record key from engaging its function.

2. Pulling back on the lever allows the Record key to engage its function and simultaneously energizes the stop solenoid. Energization of the stop solenoid stops tape travel while in functions of Play or Record, but not while in functions of Rapid Forward or Rewind.

Speed Change Knob

Operation of this knob selects either 3 3/4 ips or 7 1/2 ips tape speeds while the recorder is in any function. Rapid Forward winding can be accelerated by selecting the 7 1/2 ips tape speed. The fidelity on 7 1/2 ips selection is greater insofar as recording - reproduction is concerned.

Record Level Indicator

The record level indicator gives a visual analysis of the correct volume setting for the Record function. The left or "Normal" half of the indicator flashes to indicate a correct volume level, and the right or "Distort" half of the indicator flashes when the volume level is too high. The proper recording level may be preset with the recorder in either the Stop or Record functions. If the volume level for recording is preset in the Stop position, the Tone control should be turned to "Treble". However, the Tone control has no effect on the record level in the Record function.

Index Counter

Set the counter to zero by turning its knob toward the front of the recorder when starting to record or play back a reel of tape. If the reading of the counter is noted at various points in the tape travel, new program selections can be indexed, or previously recorded selections can be located with great accuracy.

Head Track Selector (Models T-1616 and T-1818 Only)

The head track selector knob moves the head assemblies up or down to properly orient the heads for the monaural record/playback and stereo playback operations. Refer to the "Operating Instructions," page 6.

Rear Panel Connections (See Fig. 2)

Input -- The Input jack is designed to connect the audio signals from a microphone, a phonograph, or a radio, to the recorder. The proper input circuit is automatically selected by the different lengths of input plugs. The shorter (1") plug is used with the microphone and a 1 3/16" plug is used for the radio or phono connections. It will be noticed that the input plug of the accessory microphone is equipped with 2 pins in addition to the main plug. These pins insert into the mike control socket when the mike plug is plugged into the Input jack. The pins on the mike plug are electrically connected across a normally closed switch (out position) located in the microphone. The mike switch controls the start and stop of the tape while in the Record function. The normally closed or out position of the mike switch stops tape travel. Pushing the mike switch "in" opens the switch and starts tape travel. In this manner, the tape can be held back to prevent recording unwanted breaks in material, or to precisely preset the record level while in the Record function.

P.A./Monitor -- Record Mike -- This is a slide switch which controls the output of the speaker in either the Stop (P.A.) or Record functions. With the switch in the Record Mike position, the speaker is silenced in functions of Record and Stop. With the switch in the P.A./Monitor position, the speaker is connected so that the recorder may be used as a public address system in the Stop function, or so that the program material can be monitored in the Record function. The switch has no effect when the recorder is in the Play function.

External Speaker -- This jack provides a connection for an external speaker or head phones. The nominal impedance of the external speaker should be 8 ohms, but speakers of impedances ranging from 3.2 to 16 ohms may be used with only a slight loss of power. Accessories such as the TE-401 ear phones may also be used. The associated connecting plug of the external speaker or phones will automatically disconnect the speaker in the recorder. The external speaker duplicates the functions of the internal speaker.

Remote (Used in Models T-1800 and T-1818 only) -- This remote socket is used in conjunction with an external foot pedal or desk typewriter for remote operation of the recorder.

Preamp Output — This jack is used in conjunction with the Play function of the recorder. It may be used to connect the output of the recorder's preamplifier circuitry to external Hi-Fi systems for further amplification and control.

With the combination play/record-erase head used in Models T-1600 and T-1800, the Preamp Output jack will deliver the output from monaural 2-(or twin) track tapes.

With the separate stereo in-line head used in Models T-1616 and T-1818, the Preamp Output jack will deliver the output from monaural 2-(or twin) track and monaural 4-track tapes, and/or the upper channel output from prerecorded stereo 2-track or 4-track tapes.

Stereo Preamp (used in Models T-1616 and T-1818 only)- This jack is also used in conjunction with the Play function of the recorder. It may be used to feed the lower channel output of prerecorded stereo 2-track and 4-track tapes to an external Hi-Fi system for further amplification and control.

OPERATING INSTRUCTIONS

Plug the male end of the power cord into an AC electric outlet that delivers 105-120 volts AC at 60 cps. Plug the female end of the power cord into the rear of the recorder.

Threading the Tape (Refer to Fig. 1)

1. Press Stop key.
2. Place a full reel of tape (use type "A" wind tape -- glossy side out) on the left spindle.
3. Pull a length of tape off the supply reel and lower it into the threading slot.
4. Thread the tape between the replay post and tape cutoff pin, and in front of the rewind post.
5. Attach the end of the tape to the empty take-up reel.
6. Zero the index counter for a future reference.

To Make and Play Back a Monaural Two (or Twin) - Track Recording

The material for a monaural recording may be supplied from a microphone, a radio or television, a phonograph, an external amplifier, etc. Regardless of the source of material, it must be fed by the proper input plug into the Input jack at the rear of the recorder.

1. To record:
   a. Press the Stop key and thread the recorder. In Models T-1616 and T-1818 turn the head track selector knob to the 2-Track position. This action moves the heads in a position with respect to the tape as shown in Fig. 3.
   b. Turn the tape speed selector knob to the desired tape speed, either 3 3/4 or 7 1/2 ips.
   c. Turn the tone control to Treble and set the slide switch at the rear of the recorder to the Record Mike position.
   d. Insert the input signal into the Input jack at the rear of the recorder.
   e. Adjust Volume control so that the Normal half of the record level indicator flashes, and no flashing occurs at the Distorted half.

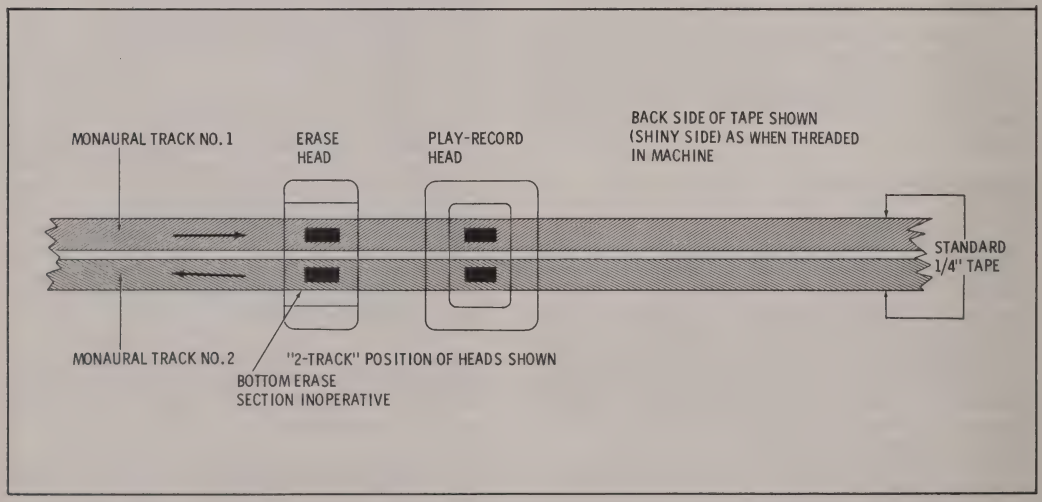
MONAURAL TRACK NO. 1
ERASE HEAD
PLAY-RECORD HEAD
BACK SIDE OF TAPE SHOWN (SHINY SIDE) AS WHEN THREADED IN MACHINE
STANDARD 1/4" TAPE
MONAURAL TRACK NO. 2
"2-TRACK" POSITION OF HEADS SHOWN
BOTTOM ERASE SECTION INOPERATIVE

Fig. 3. "2-Track" Position of Heads Shown for Monaural Record or Playback Operations in Models T-1616 and T-1818.

f. Pull back the combination Record Lock-Instant Stop lever and depress the Record key. Record key should illuminate.

g. Release the Instant Stop lever, and the recording will start.

h. After the recording of the first track is completed and tape runs out, press the Stop key.

i. To record the second track, remove the empty supply reel from the left spindle. Take the full reel of tape from the right spindle, turn it over, place it on the left spindle, and rethread the machine.

j. Record the second track in the same manner as the first track.

2. To play back:

a. With the Stop key depressed, place the recorded reel of tape on the left spindle and thread the machine. Make sure that the head track selector knob is turned to the 2-Track position.

b. Press the Play key; the key should illuminate. Adjust the Volume and Tone controls for the desired listening pleasure.

c. After the playback of one track is completed and tape runs out, press the Stop key.

d. To play back the other track remove the empty supply reel from the left spindle. Take the full reel of tape from the right spindle, turn it over, place it on the left spindle, and rethread the tape.

e. Press the Play key and play back the other track.

To Record or Play Four Separate Monaural Tracks (Models T-1616 and T-1818 Only)

The basic operations for the record and playback of 4-track monaural tapes are the same as the record and playback of monaural 2-(or twin) track tapes. However, for the record or playback of 4-track monaural tapes, the head track selector knob must be turned to positions A and B. To record or play 4 separate monaural tracks, proceed as follows:

1. Arbitrarily designate by a label or some other means, "Side 1" to one of the sides of both the supply and take-up reels. Designate "Side 2" to the other side of both the supply and take-up reels. Place both the supply and take-up reels on their respective spindles with "Side 1" up. Thread the machine.

2. Place the head track selector knob in the "A" position. This action moves the heads in position with respect to the tape as shown in Fig. 4.

3. To record or play track No. 1 on "Side 1" press the desired function key.

4. At the end of the reel, take the full reel from the right spindle, turn it over to "Side 2", and place it on the side spindle. Place empty take-up reel on right spindle with "Side 2" up. Thread the machine.

5. To record or play track No. 2 on "Side 2", press the desired function key.

6. At the end of the reel, turn the head track selector knob to the "B" position. This action moves the heads in a position with respect to the tape as shown in Fig. 5.

7. Take the full reel from the right spindle, turn it over to "Side 1", and place it on the

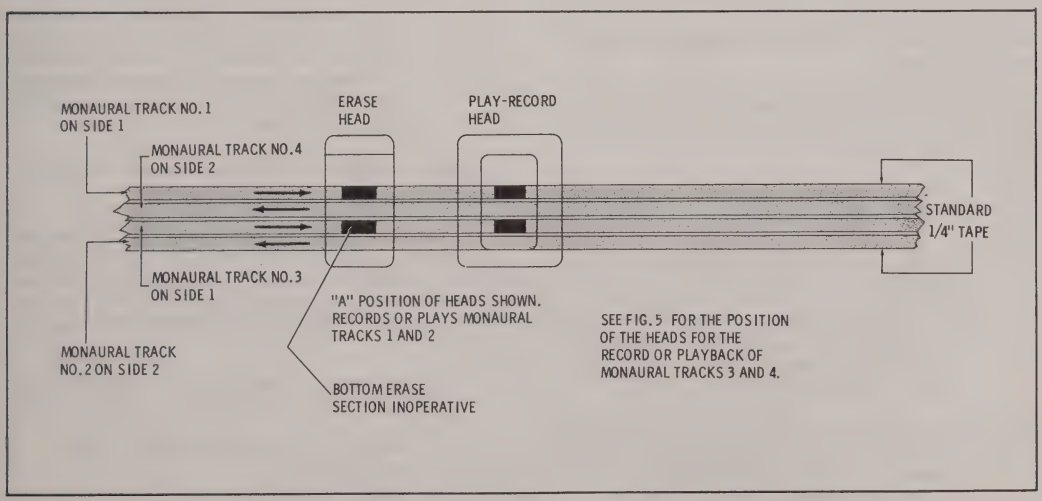
MONAURAL TRACK NO. 1 ON SIDE 1
MONAURAL TRACK NO. 4 ON SIDE 2
ERASE HEAD
PLAY-RECORD HEAD
STANDARD 1/4" TAPE
MONAURAL TRACK NO. 3 ON SIDE 1
MONAURAL TRACK NO. 2 ON SIDE 2
"A" POSITION OF HEADS SHOWN. RECORDS OR PLAYS MONAURAL TRACKS 1 AND 2
SEE FIG. 5 FOR THE POSITION OF THE HEADS FOR THE RECORD OR PLAYBACK OF MONAURAL TRACKS 3 AND 4.
BOTTOM ERASE SECTION INOPERATIVE

Fig. 4. "A" Position of Heads Shown in Models T-1616 and T-1818.

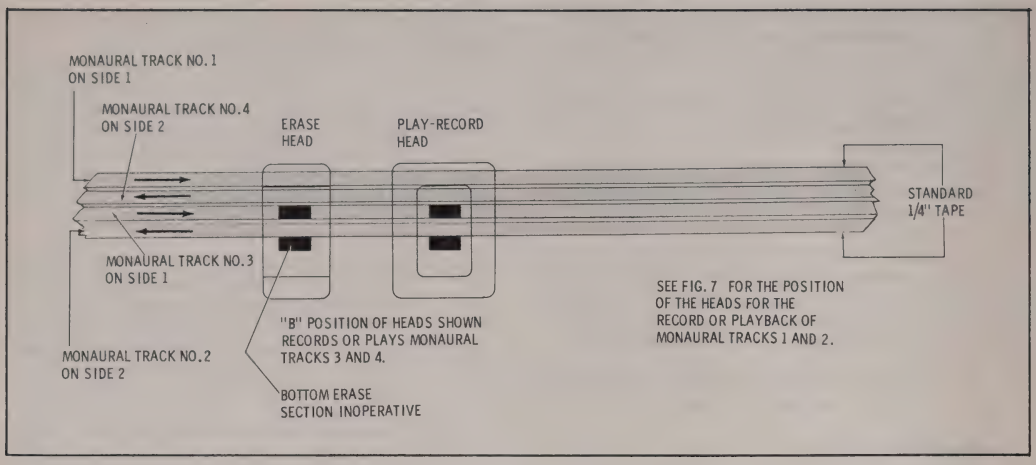

Fig. 5. "B" Position of Heads Shown in Models T-1616 and T-1818.

left spindle. Place empty take-up reel on right spindle with "Side 1" up. Thread the machine.

8. To record or play track No. 3 on "Side 1", press the desired function key.

9. At the end of the reel, take the full reel from the right spindle, turn it over to "Side 2", and place it on the left spindle. Place empty take-up reel on right spindle with "Side 2" up. Thread the machine.

10. To record or play track No. 4 on "Side 2", press the desired function key. This completes the record or playback of 4 separate monaural tracks.

A simplified chart of the above procedure is located in the case cover.

To Play Stereo Two-Track Tapes (Models T-1616 and T-1818 Only)

Stereo 2-track tapes contain one full length recording on the full side of the tape. Play a stereo 2-track tape as follows:

1. Place the full reel of tape on the left spindle and thread the machine.

2. Place the speed selector knob in the 7 1/2 ips position.

3. Turn the head track selector knob to the "2-Track" position. This action moves the heads in a position with respect to the tape as shown in Fig. 6.

4. Connect the Stereo Preamp jack at the rear of the recorder to an external amplifier and speaker system. Place the speaker at least 7 feet to the right of the recorder.

5. Press the Play key, and play the tape through in one direction only.

6. The upper stereo channel or track is played back through the tape recorder and its self-contained speaker (left speaker). The lower stereo channel or track is played back through the external amplifier and speaker system (right speaker).

7. In a Hi-Fi hook-up, it may be desired to play back the upper stereo channel through an auxiliary amplifier and speaker system to more closely match the playback of the lower stereo channel. To do this, connect an auxiliary amplifier and speaker system to the Preamp Output jack. Set the recorder's Tone control to "Hi-Fi" position and adjust the recorder's Volume control until the Normal half of the record level indicator flashes. Thereafter, adjust the volume and tone controls on the auxiliary amplifier for the desired listening pleasure. For best stereo reproduction, the right and left speakers should be identical units, of good quality, and at least 7 feet apart.

To Play Stereo Four-Track Tapes (Models T-1616 and T-1818 Only)

Stereo 4-track tapes contain two full length recordings (an upper and lower track for each recording) on the full side of the tape. The procedure for playing 4-track stereo is essentially the same as for playing 2-track stereo. Play 4-track stereo in the following manner:

1. Place the full reel of tape on the left spindle and thread the machine.

2. Place the speed selector knob in the 7 1/2 ips position.

3. Turn the head track selector knob to the "A" position. This action moves the heads

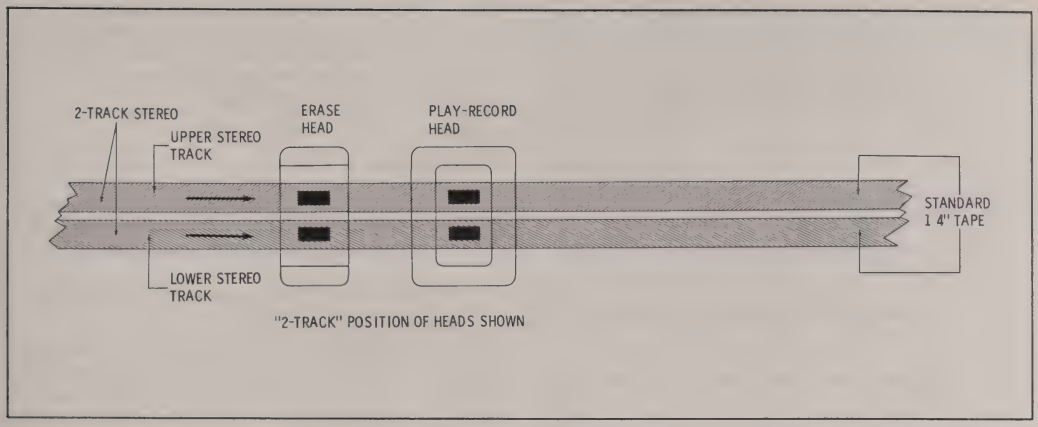

Fig. 6. "2-Track" Position of Heads Shown for Stereo 2-Track Playback in Models T-1616 and T-1818.

in a position with respect to the tape as shown in Fig. 7.

4. Follow the instructions as described in Step 4 under "To Play Stereo Two-Track Tapes".

5. Press the Play key and play one full length recording through the recorder.

6. Refer to Steps 6 and 7 under "To Play Stereo Two-Track Tapes".

7. At the end of the reel, take the full reel from the right spindle, turn it over, and place it on the left spindle. Place empty take-up reel on right spindle and rethread the machine.

8. Leave the head track selector knob in position "A". Press the Play key and play the second full length recording through the recorder. Refer to Steps 6 and 7 under "To Play Stereo Two-Track Tapes".

Erasing Tape

Whenever a monaural recording is made, any prerecorded material on the tape is automatically erased before the new material is recorded. Erasure is accomplished only when the recorder is in the Record function. In Models T-1600 and T-1800 the erase head erases 1/2 of the tape each time the tape passes the head. In Models T-1616 and T-1818 the erase head erases only 1/4 of the tape each time the tape passes the head. To erase the tape without recording new sound, turn the Volume control down and press the Record key.

Public Address System

The recorder may be used as a public address system when the recorder is placed in the Stop function. Set the slide switch at the rear of the recorder to the P.A./Monitor position and feed the signal from an external source such as a microphone, radio, AM-FM tuner, phonograph, etc., into the Input jack at the rear of the recorder. The tone control is fully effective in the P.A. function.

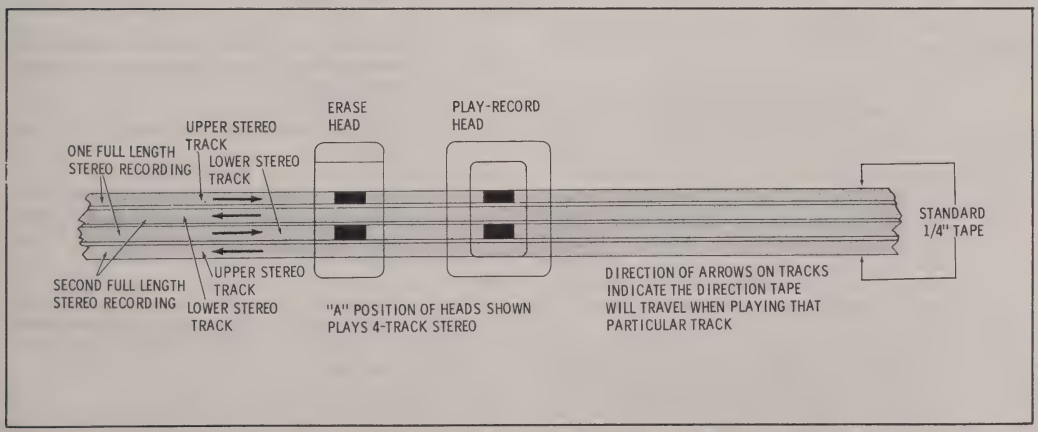
ONE FULL LENGTH STEREO RECORDING
UPPER STEREO TRACK
LOWER STEREO TRACK
ERASE HEAD
PLAY-RECORD HEAD
STANDARD 1/4" TAPE
SECOND FULL LENGTH STEREO RECORDING
UPPER STEREO TRACK
LOWER STEREO TRACK
"A" POSITION OF HEADS SHOWN PLAYS 4-TRACK STEREO
DIRECTION OF ARROWS ON TRACKS INDICATE THE DIRECTION TAPE WILL TRAVEL WHEN PLAYING THAT PARTICULAR TRACK

Fig. 7. "A" Position of Heads Shown for Stereo 4-Track Playback in Models T-1616 and T-1818.

NOTE: When using the microphone for P.A., keep the microphone switch in the locked position (press in and up to lock). For best results plug an external auditorium speaker into the External Speaker jack. Keep the distance between the microphone and speaker as far as possible to prevent feedback and howling.

DISASSEMBLY INSTRUCTIONS

A. To Service Amplifier Tubes Only

Turn recorder on its side and remove bottom cover as follows:

1. Remove 2 screws in line with the two front rubber feet.
2. Remove screw from each of the two front rubber feet.
3. Remove screw from right side panel 1/2" above right rear foot.
4. Remove screw in left rear rubber foot.
5. Remove 2 screws, one each 1" to the side of the top cover hinges.
6. Remove bottom cover.

B. To Expose Top of Transport Mechanism

Remove escutcheon (5) as follows (refer to Exploded View, Fig. 8):

1. Remove 2 screws (4), one from each corner of the escutcheon front edge. (Do not remove 2 screws to the right of the Back Space bar.)
2. Remove six screws (6) from the escutcheon edges. (Do not remove four screws around index counter windows or the two near back space bar.)
3. Tilt rear of escutcheon upward to free the index counter drive belt (10) from its worm gear. Remove escutcheon.

Remove top cover plate (15) as follows (refer to Exploded View, Fig. 8):

1. The automatic tape cutoff switch (21), rewind post (12), and replay post (13) of the recorder are mounted on the top cover plate and are electrically connected to the amplifier chassis through an interconnecting cable terminated in a 7-pin plug (M29, Fig. 9). It is necessary to remove this plug from the amplifier chassis before removing the top cover plate. Therefore, remove bottom cover as outlined in Step A and remove 7-pin plug from amplifier chassis.
2. Remove 5 screws (14) from top cover plate. Carefully remove top cover plate with attached interconnecting cable. Exposing the top of the tape transport mechanism will permit practically all major mechanical repair. It will also allow a close inspection of the various leaf switches to insure that they are properly operated when they are actuated by one of the function keys.

C. To Remove Amplifier Chassis from Transport Mechanism

Servicing the internal circuitry of the amplifier chassis requires its removal from the transport mechanism. Before any electrical checks can be made, a short must be put across pins 1 to 7 of socket M28. Follow disassembly Steps A and B and continue in the following manner:

1. Disconnect speaker plug (M25, Fig. 9) from amplifier chassis.
2. Remove one screw from the bottom front of each side panel. Loosen left side panel.
3. Remove front panel and speaker (SP1) assembly.
4. Remove pin (item 196 Fig. 10) which secures the instant stop lever linkage to the pivot arm of the stop solenoid.
5. Remove 2 screws from top of right side panel and remove right side panel.
6. Remove the 3 remaining screws on left side panel and remove left side panel.
7. Remove the following plugs from the amplifier chassis (see Fig. 9): play/record-erase head, 4-prong plug (M18), switching control circuit 9-pin plug (M31), stop solenoid 3-prong plug (M27), rewind solenoid and motor 4-prong plug (M33), and lower stereo channel input plug (M36, used in stereo Models T-1616 and T-1818).
8. Remove hex head screw which secures the Normal-Distort lamp bracket to the transport mechanism.
9. Pull off the nylon function switch arm (see Fig. 9).
10. Remove 3 Phillip's head screws and 1 hex head screw which secure the amplifier chassis to the transport mechanism (see Fig. 9).
11. Unlatch the arm which holds the amplifier chassis to the left side of the transport mechanism (see Fig. 2). Remove amplifier chassis.

To reassemble, reverse the disassembly procedure utilizing the following precautions. It will be noticed that the Tone and Volume knobs engage gear

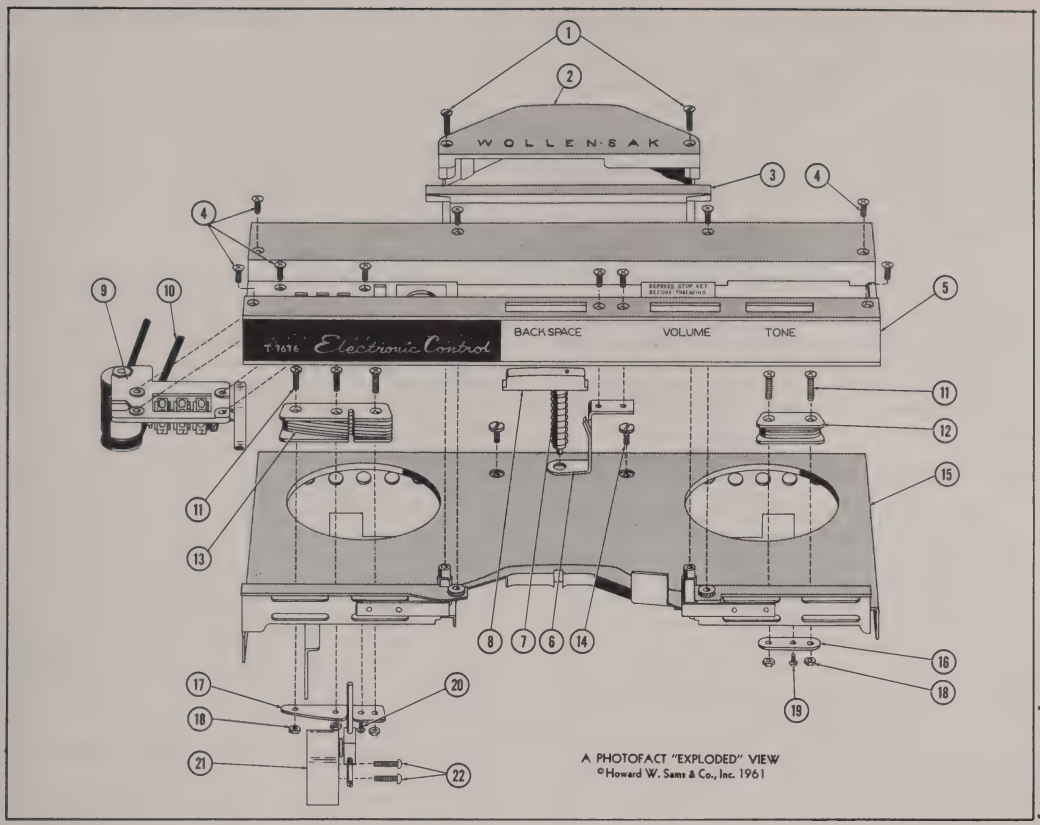

Fig. 8. Exploded View of Top Cover Plate and Escutcheon Assemblies.

train drives that determine the settings of the on-off switch/Tone control and the Volume control. It is necessary that the Volume and Tone knobs, and the nylon gears attached to the control shafts, be properly oriented with respect to each other so that the relative control setting may be properly designated by the control knobs through the escutcheon windows. This orientation in all probability will be disturbed at some time during the disassembly procedures. Therefore, when reassembling, realign the knobs and gear train drive as follows:

1. Reassemble the amplifier chassis to the transport mechanism, allowing the intermediate metal gear wheels to engage the nylon gear wheels at any position.

2. Temporarily place the escutcheon in its normally mounted position over the Tone and Volume knobs.

3. Push on the bottom of the Volume intermediate (metal) drive gear (see Fig. 10) to disengage it from the Volume knob. While holding the gear in the disengage position, turn Volume nylon gear to the extreme counterclockwise position; the Volume knob should not turn.

4. With the Volume knob disengaged, turn it by hand until the number "1" appears in the center of the escutcheon window. Now allow the metal intermediate gear to engage the Volume knob. Turn the knob to the right to see that the nylon gear is driven, without slippage, in the clockwise direction.

5. To align the Tone control drive train, pull out on the bottom of the Tone intermediate (metal) drive gear (see Fig. 10) to disengage it from the Tone knob. While holding the gear in the disengaged position, turn Tone nylon gear to the extreme counterclockwise position; the Tone knob should not turn.

6. With the Tone knob disengaged, turn it by hand until the words "Treble Off" appear in the center of the escutcheon window. Now allow the metal intermediate gear to engage the Tone knob. Turn the knob to the right to see that the nylon gear is driven, without slippage, in the clockwise direction.

MECHANICAL AND ELECTRICAL ANALYSIS OF HIGH-SPEED TRANSPORT OF TAPE

High speed transport of the tape in functions of Rapid Forward, Rewind, and Back Space, is engaged from the AC rewind solenoid **(M8, Fig. 2).**

The Rewind and Rapid Forward keys, and the Back Space bar have leaf switches (M13 and M14, Fig. 10) mounted beneath them which electrically control the AC rewind solenoid through the DC **(M5, Fig. 9)** and AC **(M6, Fig. 9) relays.**

A nylon linkage arm (item 69, Fig. 10) just to the rear of the upper mechanism plate (item 75, Fig. 10), determines whether the recorder engages the Rewind, Back Space, or Rapid Forward functions when the AC rewind solenoid is energized. The nylon linkage arm remains in its normal or rest position (front position) during all functions of the recorder except Rapid Forward.

Rewind Operation (Refer to Figs. 11 and 12)

Depressing the Rewind key closes leaf switch contacts 1 and 2, and energizes the AC relay, causing its contacts to close. After the Rewind key is released, the AC relay remains energized through leaf spring contacts 5 and 6 and AC relay contacts 3 and 4. Closing of the AC relay contacts energizes the DC relay through AC relay contacts 1 and 2. The DC relay remains energized as long as the AC relay is energized. Energization of the DC relay causes its contacts to close. Closing of the DC relay contacts energizes the stop solenoid through DC relay contacts 5 and 6, and simultaneously energizes the rewind solenoid through DC relay contacts 5 and 6 and AC relay contacts 5 and 6. Energization of the rewind solenoid pulls the rewind spindle (24) on its arm against the rewind pulley (204), thus causing rewind of the tape. The stop solenoid is energized in the Rewind function so that the pressure roller disengages the capstan.

Depressing the Stop key opens leaf switch contacts 5 and 6 which de-energizes the AC relay. De-energization of the AC relay de-energizes the DC relay, and the stop and rewind solenoids.

Back Space Operation (Refer to Figs. 11 and 12)

The Back Space is designed primarily for use while the recorder is engaged in the Play function, but it may also be used while the recorder is engaged in either the Stop or Record function.

The Back Space and Rewind operations are controlled alike mechanically, but differ in how they are controlled electrically. With the recorder in the Play function, depressing the Back Space bar closes leaf switch contacts 7 and 8 and energizes the DC relay, causing its contacts to close. Closing of the DC relay contacts energizes the stop solenoid which disengages the pressure roller from the capstan. Depressing the Back Space bar simultaneously closes the microswitch (M15, Fig. 10) and energizes the rewind solenoid through DC relay contacts 5 and 6. The rewind solenoid pulls the rewind spindle (24) on its arm against the rewind pulley (204), thus causing rewind of the tape. The rewind solenoid also pulls the high speed transport arm (230) and causes the front slide cam (item 152, Fig. 10) to close leaf switch contacts 11 and 12 which discharges capacitor C4A through R42. Rewind will continue only while the Back Space bar is depressed. Releasing the bar opens microswitch contacts 1 and 2 and leaf switch contacts 7 and 8. Opening of microswitch contacts 1 and 2 de-energizes the rewind solenoid, causing the rewind to stop and opening leaf switch contacts 11 and 12. With the leaf switch contacts open, capacitor C4A charges through the series combination of R44, L3, and R43, in parallel with R41. Therefore, sufficient current continues to flow through the DC relay to hold its contacts 5 and 6 in the closed position, causing a time delay before the circuit to the stop solenoid is opened. When capacitor C4A becomes charged, current ceases to flow through the relay coil, thus opening its relay contacts 5 and 6 and de-energizing the stop solenoid. Upon de-energization of the stop solenoid, the tape resumes its forward travel in the Play function. The AC relay is inoperative in Back Space.

Rapid Forward Operation (Refer to Figs. 11 and 13)

The Rapid Forward and Rewind operations are controlled alike electrically but differ in how they are controlled mechanically.

Depressing the Rapid Forward Key closes leaf switch contacts 3 and 4, and energizes the AC relay, causing its contacts to close. The subsequent electrical control of the Rapid Forward operation is identical to the Rewind operation; therefore, refer to the electrical circuit description for the "Rewind Operation." Depressing the Rapid Forward key simultaneously moves the slide arm (150) against the nylon linkage arm (69), moving it to the rear position. The nylon linkage arm engages the rapid forward stud, and upon energization of the rewind solenoid, pulls the rapid forward idler (161) into its spindle (28), thus causing the rapid forward movement of the tape. The nylon linkage arm (69), when moved to the rear position, also moves the interlock lever (52) to prevent the rewind spindle (24) from engaging the rewind pulley (204).

MECHANICAL AND/OR ELECTRICAL TROUBLES ASSOCIATED WITH THE HIGH-SPEED TRANSPORT OF TAPE

Recorder Goes Into Rewind When Rapid Forward Key Is Depressed

1. Leaf switch (M13) makes contact before nylon linkage arm (69) moves to the rear position. Readjust switch to contact on last 1/8th stroke of Rapid Forward key.
2. Nylon linkage arm (69) is not moved when Rapid Forward key is depressed. Check for binding of mechanical components. Check to see that nylon bell crank (item 148, Fig. 13) engages the slide arm (150).
3. Rewind arm interlock lever (52) binding against rewind arm prevents nylon linkage arm (69) from moving. Remove left spindle and adjust the end of rewind arm interlock lever to clear rewind arm.

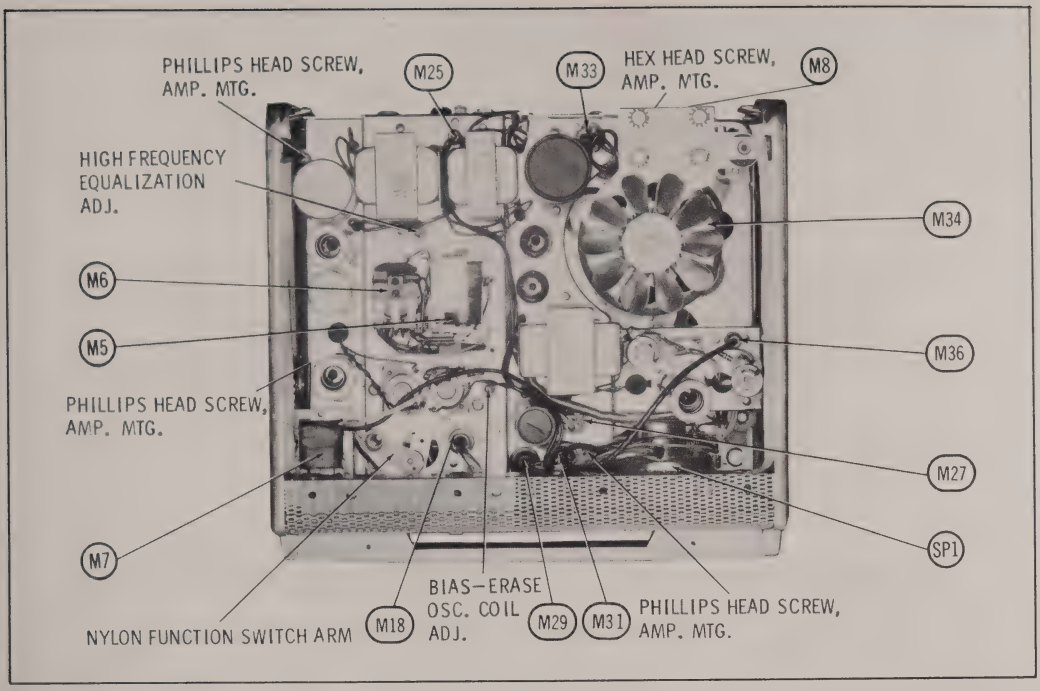

Fig. 9. Bottom View of Recorder With Bottom Cover Removed - Model T-1616 Shown.

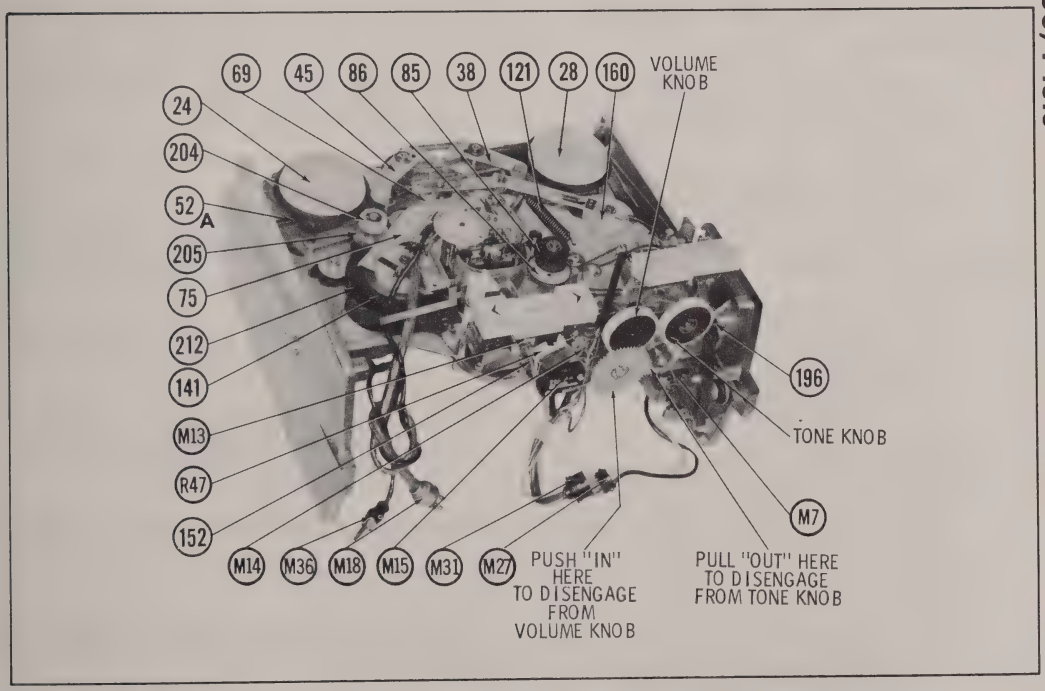

Fig. 10. View of Recorder With Escutcheon (5), Top Cover Plate (15), Bottom Cover, Front Panel and Speaker Assembly, and Amplifier Chassis Removed. Model T-1616 Shown.

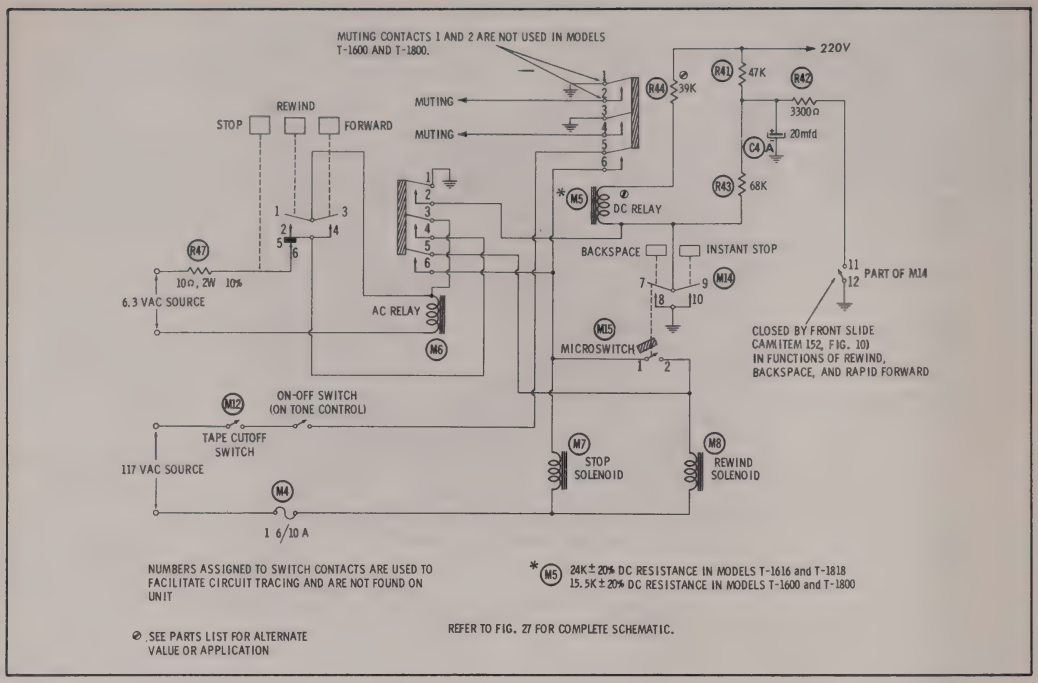
MUTING CONTACTS 1 AND 2 ARE NOT USED IN MODELS T-1600 AND T-1800.
220V
R41 47K
R42 3300Ω
C4 20mfd
R44 39K
MUTING
MUTING
REWIND
STOP
FORWARD
M5 DC RELAY
R43 68K
BACKSPACE
INSTANT STOP
M14
PART OF M14
CLOSED BY FRONT SLIDE CAM ITEM 152, FIG. 10) IN FUNCTIONS OF REWIND, BACKSPACE, AND RAPID FORWARD
R47
10Ω, 2W 10%
6.3 VAC SOURCE
AC RELAY
M6
M15 MICROSWITCH
M12 ON-OFF SWITCH (ON TONE CONTROL)
TAPE CUTOFF SWITCH
117 VAC SOURCE
M4
1 6/10 A
M7 STOP SOLENOID
M8 REWIND SOLENOID
NUMBERS ASSIGNED TO SWITCH CONTACTS ARE USED TO FACILITATE CIRCUIT TRACING AND ARE NOT FOUND ON UNIT
* M5 24K ± 20% DC RESISTANCE IN MODELS T-1616 and T-1818
15.5K ± 20% DC RESISTANCE IN MODELS T-1600 and T-1800
⊘ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
REFER TO FIG. 27 FOR COMPLETE SCHEMATIC.

Fig. 11. Simplified Electrical Circuit for the Rewind, Back Soace, and Rapid Forward Operations.

Recorder Goes Into Rapid Forward When Rewind Key Is Depressed

1. Nylon linkage arm remains in the rear position. Check for binding of mechanical components.

2. Rewind arm interlock tension spring (item 52A, Fig. 10) disconnected or broken. Reconnect or replace spring.

No Rapid Forward or Rewind

1. Rewind solenoid does not actuate the mechanism. Press either the Rewind or Rapid Forward key and listen for clicking sound associated with the solenoid plunger movement at the left rear side panel of the recorder. If the solenoid plunger is heard but does not operate the mechanism, check for binding of mechanical components. Press the Back Space bar to see if the rewind solenoid will operate. If solenoid operates, the DC relay is functioning properly. Therefore, check R47, M13, and the AC relay associated with the Rewind and Rapid Forward circuits (see Fig. 11).

NOTE: If AC relay does not close without chattering, check R47 for increased resistance. The voltage across the AC relay coil and R47 in series should be in excess of 5.4 VAC to eliminate chattering.

2. Grease or oil on motor pulley (204 and 205) surfaces causes rewind spindle (24), high speed idler assembly (141), or low speed idler assembly (212) to slip (see Fig. 10). Clean motor pulleys, spindle tire, and idler assemblies with alcohol.

Rewinds, But No Rapid Forward - Capstan Revolves

1. Rapid forward idler slide assembly (160) binding in upper mechanism plate (75). Make sure that the idler slide and upper mechanism slide surfaces are free from dirt. If dirty, clean with alcohol.

2. Grease or oil on rapid forward idler assembly (161) tire or on take-up spindle (28). Clean with alcohol.

3. Rapid forward idler assembly (161) is not held against take-up spindle (28) or flywheel (210). Connect or replace rapid forward idler spring (157).

Rapid Forward, But No Rewind - Capstan Revolves

Grease or oil on rewind spindle (24). Clean with alcohol.

Rewind and Rapid Forward Functions Properly, But No Back Space

1. Shaft on Back Space bar too short and does not actuate the leaf switch (M14) and microswitch (M15). Use a small spline key

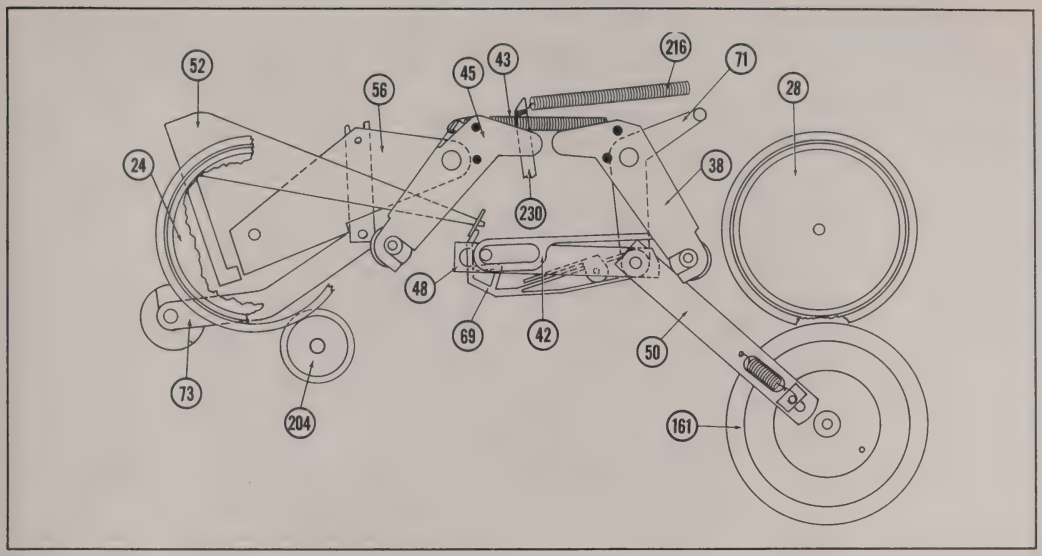

Fig. 12. A Working View of Mechanical Parts Used in the Rewind and Backspace Operations.

wrench and adjust set screw in Back Space shaft through tiny access hole in top of bar until proper Back Space operation is obtained. After screw is properly adjusted, bond with "Locktite".

2. Rewind solenoid is not energized. Check leaf switch (M14) and microswitch (M15) for proper operation. Replace microswitch if defective, or adjust leaf switch if not operating properly.

Back Space Continues After Back Space Bar Is Released

1. Shaft on the Back Space bar too long and does not allow the leaf switch (M14) and

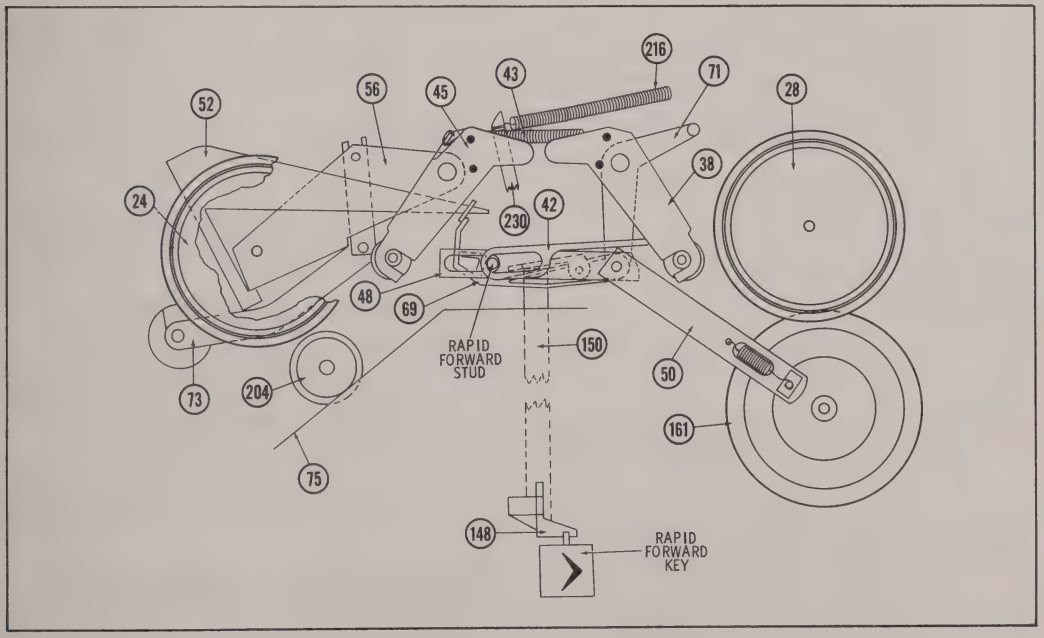

Fig. 13. A Working View of Mechanical Parts Used in the Rapid Forward Operation.

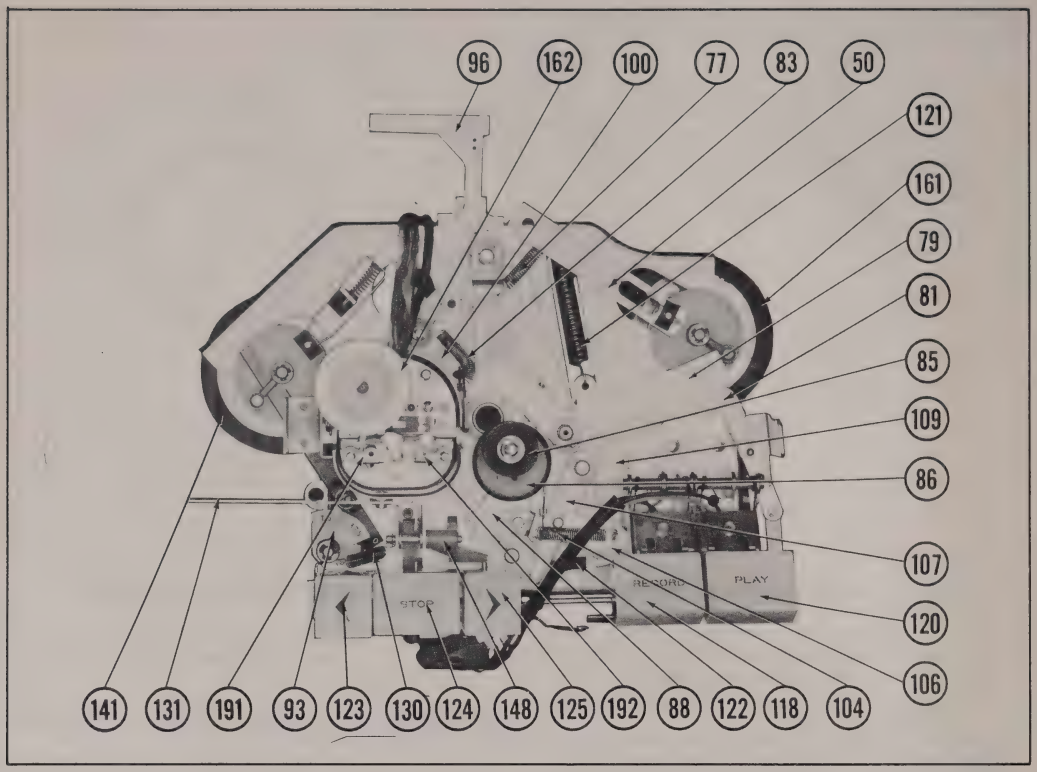

Fig. 14. Top View of Top Mechanism Plate Assembly -- Model T-1616 Shown.

microswitch (M15) to open. Use a small spline key wrench and adjust set screw in Back Space shaft through tiny access hole in top of bar until proper Back Space operation is obtained. After screw is properly adjusted, bond with "Locktite".

2. Defective microswitch. Replace. Check leaf switch to see if leaf has become bent or twisted. Adjust leaf.

No Delay After Back Space With Recorder In the Play Function

1. Leaf switch (M14) is not contacting the front slide cam (item 152, Fig. 10). Readjust leaf so that contact is made.

2. The following delay circuit components may be defective (see Fig. 11): DC relay (M5), R41, R43, R44, or C4A. Replace defective components.

Continuous Delay After Back Space With Recorder In the Play Function

1. High speed arm (item 73, Fig. 15) is not returning to its normal or rest position after the rewind solenoid is released. Return spring (item 216, Fig. 15) broken or disconnected. Replace or connect return spring. Check spring for proper tension. Check for binding of mechanical components.

2. The following delay circuit components may be defective (see Fig. 11): DC relay (M5), R41, R43, R44, or C4A. Replace defective components.

2. Defective microswitch. Replace. Check leaf switch to see if leaf has become bent or twisted. Adjust leaf.

No Delay After Back Space With Recorder In the Play Function

1. Leaf switch (M14) is not contacting the front slide cam (item 152, Fig. 10). Readjust leaf so that contact is made.

2. The following delay circuit components may be defective (see Fig. 11): DC relay (M5), R41, R43, R44, or C4A. Replace defective components.

Continuous Delay After Back Space With Recorder in the Play Function

1. High speed arm (item 73, Fig. 15) is not returning to its normal or rest position

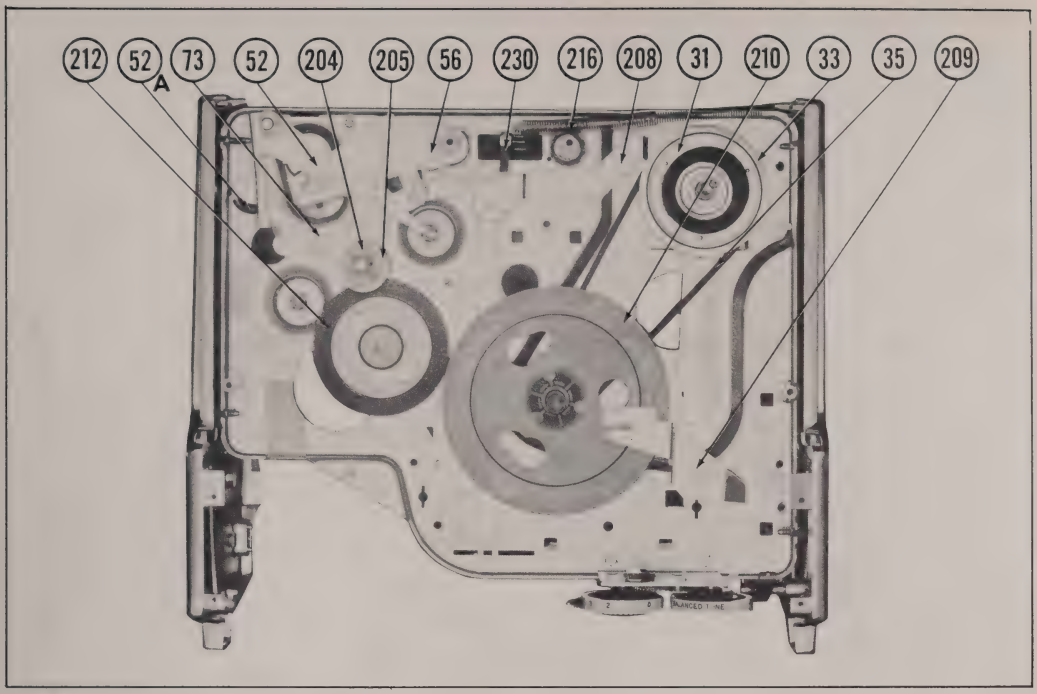

Fig. 15. Top View of Transport Mechanism With Top Mechanism Plate, Spindle Assemblies, Brake Assemblies, and Rapid Forward Linkages Removed.

after the rewind solenoid is released. Return spring (item 216, Fig. 15) broken or disconnected. Replace or connect return spring. Check spring for proper tension. Check for binding of mechanical components.

2. The following delay circuit components may be defective (see Fig. 11): DC relay (M5), R41, R43, R44, or C3A. Replace defective components.

Time Delay Too Short After Back Space With Recorder in the Play Function

1. DC relay opens with 0.75 ma or more flowing through coil.

2. Check in order of importance: R41, R43, R44, and C4A for decrease in component values (see Fig. 11).

3. DC relay coil resistance is too low. Check resistance (Fig. 11).

Time Delay Too Long After Back Space With Recorder in the Play Function

1. DC relay remains closed with 0.5 ma or less flowing through coil.

2. Check in order of importance: R41, R43, R44, and C4A for increase in values (see Fig. 11).

3. DC relay coil resistance is too high. Check resistance (Fig. 11).

AUTOMATIC CONTROL CIRCUIT DESCRIPTION AND ASSOCIATED SERVICE NOTES FOR CORRECTIVE MAINTENANCE (REFER TO FIG. 16)

Instant Stop Operation With Recorder in the Play Function

Pressing the Instant Stop lever closes switch contacts 9 and 10. Current flows through R44 and the relay coil, closing the DC relay. R41 and R43 form a voltage divider slightly reducing the charge on capacitor C4A. As the relay closes, contacts 1 and 2, and 3 and 4 first mute the amplifiers, then supply power through contacts 5 and 6 to the stop solenoid.

NOTE: Muting contacts 1 and 2 are not used in Models T-1600 and T-1800.

Releasing the Instant Stop lever opens switch contacts 9 and 10; thereby, opening the circuit to the DC relay. The capacitor C4A quickly returns to full

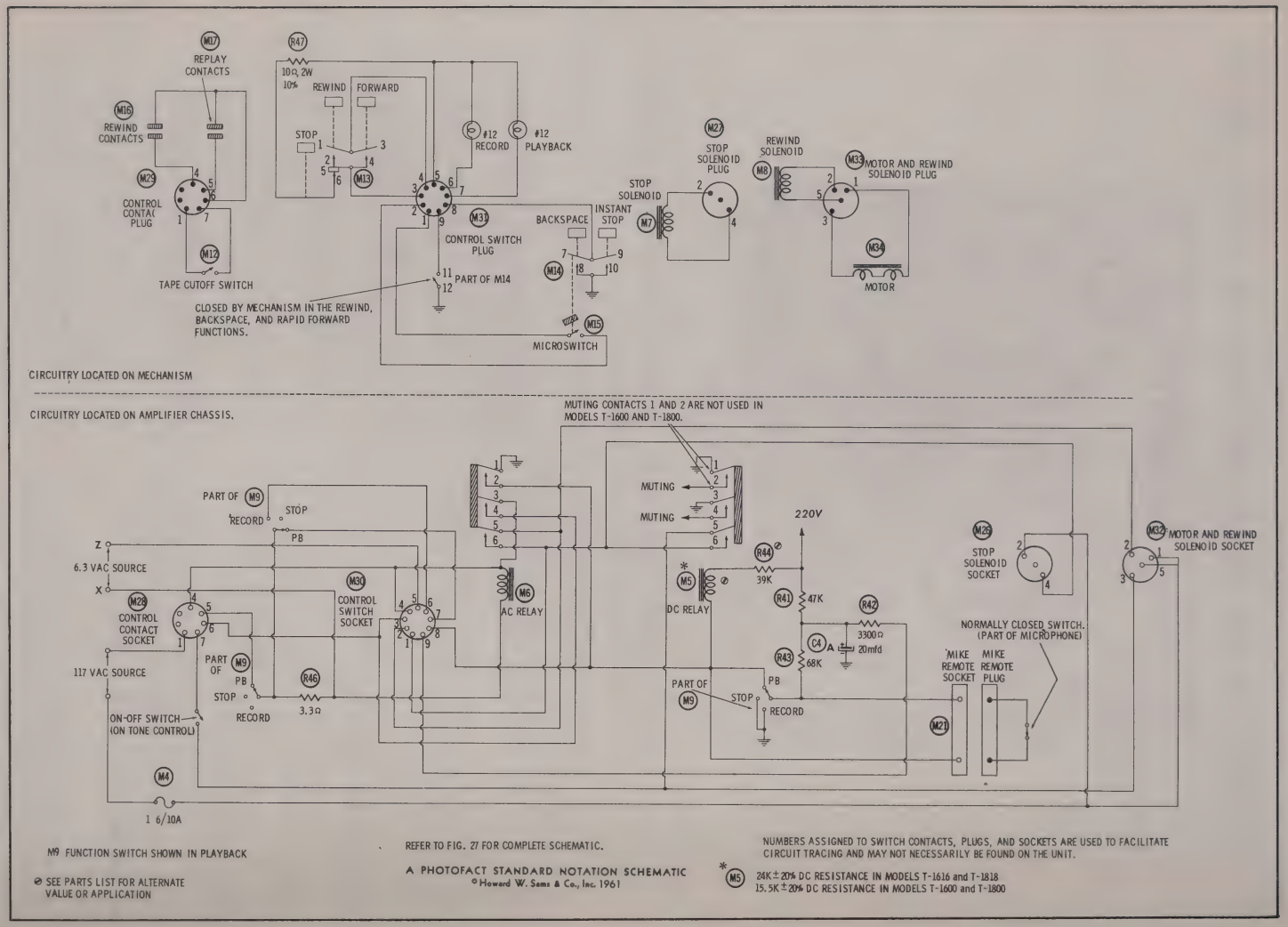

Fig. 16. Simplified Schematic for the Automatic Control Feature Operations.

charge through the parallel - series combination of R44, the relay coil, and R43 in one leg, and R41 in the other leg. Current flows through the relay coil for a very short time, providing little delay before relay contacts 5 and 6 open, disrupting power to the stop solenoid and causing the tape to start immediately.

In the Record function, there is no delay in starting and stopping the tape. In Record, R41, R43, and C4A are switched out of the circuit, and pressing either the Instant Stop lever or the microphone remote switch will cause the tape to stop.

Service Notes:

A. The DC relay will not close if:

1. More than 2.6 ma of current is required to operate the relay.
2. R44 resistance is too high.
3. Relay coil resistance is too high.

B. The DC relay will not open instantly (0.5 seconds maximum) if:

1. Relay remains closed with 0.5 ma or less flowing through relay coil.
2. Capacity of C4A too high, or its leakage exceeds 0.3 ma.
3. R41 resistance is too high.
4. R44 and R43 resistance is too low.

Automatic Rewind Operation With Recorder in the Play Function

Rewind begins when the metal tab on the tape passes over the contacts on the rewind post. The tab shorts the rewind contact and completes the circuit through R47 to the AC relay, causing its contacts to close. Closing of the AC relay contacts closes the circuit to the DC relay through AC relay contacts 1 and 2. Closing of the DC relay first mutes the amplifiers through contacts 1 and 2, and 3 and 4, then simultaneously closes the circuit to the stop solenoid through DC relay contacts 5 and 6 and to the rewind solenoid through DC relay contacts 5 and 6 and AC relay contacts 5 and 6. The short is removed from the rewind contacts as the tape starts to rewind, but the AC relay remains closed through its contacts 3 and 4. Energizing the rewind solenoid causes the front slide cam (item 152, Fig. 10) to close leaf switch contacts 11 and 12 which discharges capacitor C4A through R42. The recorder remains engaged in the Play function during automatic rewind.

Service Notes:

A. If the tape tab does not cause automatic rewind, or if automatic rewind operation is intermittent, check and/or perform the following:

1. Clean tape tab and surfaces of rewind contacts.
2. Tape tab may be worn out or improperly positioned. Position tab correctly.
3. Surfaces of rewind contacts may not be parallel. Loosen clamping screws and realign contacts; retighten clamping screws.

B. The AC relay will not operate if R47 is open or its resistance is too high.

C. If AC relay does not close without chattering, check R47 for increased resistance. The voltage across the AC relay coil and R47 in series should be in excess of 5.4 VAC to eliminate chattering.

Automatic Replay Operation With Recorder in the Play Function

Automatic replay operates only when the recorder is in the Play function and during automatic rewind. With the tape progressing in automatic rewind, the replay begins when the metal tab on the tape passes over the contacts on the replay post. The tab shorts the replay contacts and connects R46 across the AC relay coil through AC relay contacts 3 and 4. In effect, R46 shorts the relay coil and causes it to open. Refer to the simplified equivalent replay circuit in Fig. 17. Because the metal tab on the tape moves rapidly over and past the replay contacts while rewinding, the AC relay must open within .012 seconds. If the AC relay were directly shorted instead of being shorted through R46, the high inductive kick voltage developed across the coil upon de-energization would produce enough current to hold in the relay longer than .012 seconds. When the AC relay opens, the rewind solenoid de-energizes, the automatic rewind stops, and leaf switch contacts 11 and 12 open. During automatic rewind, capacitor C4A has become discharged and when leaf switch contacts open, C4A recharges through the series combination of R44, (M5) and R43, in parallel with R41. Therefore, sufficient current continues to flow through the DC relay to

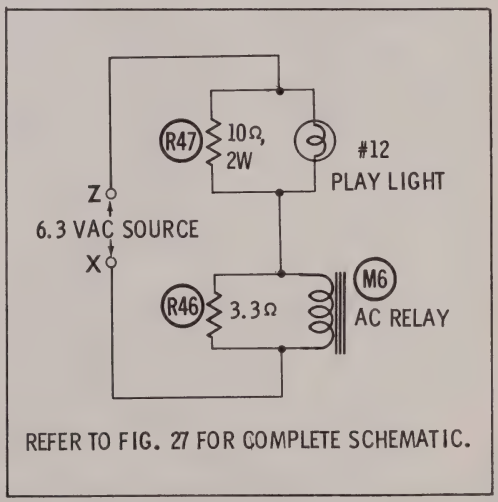

Fig. 17. Equivalent Replay Circuit.

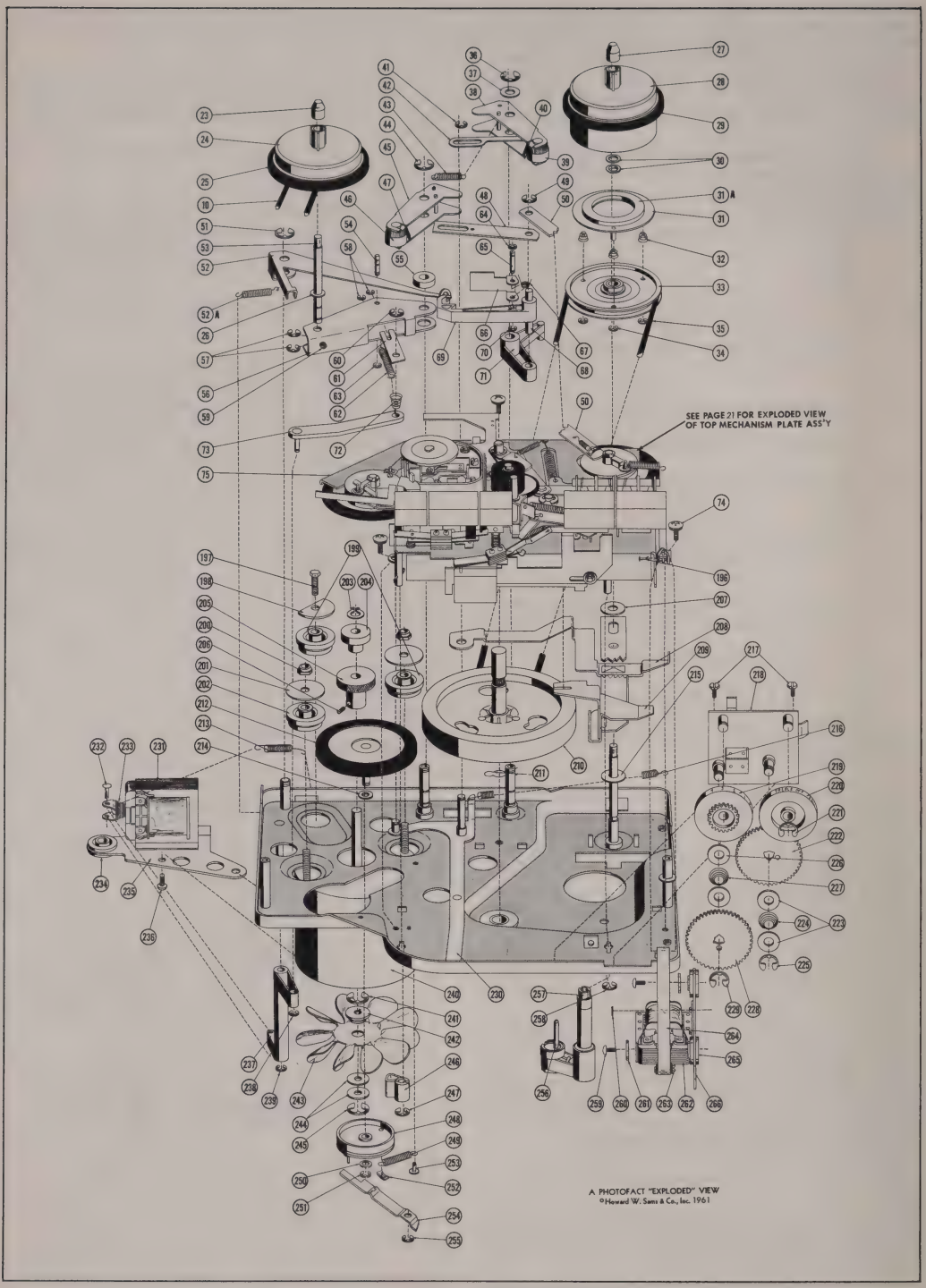

Fig. 18. Exploded View of Transport Mechanism.

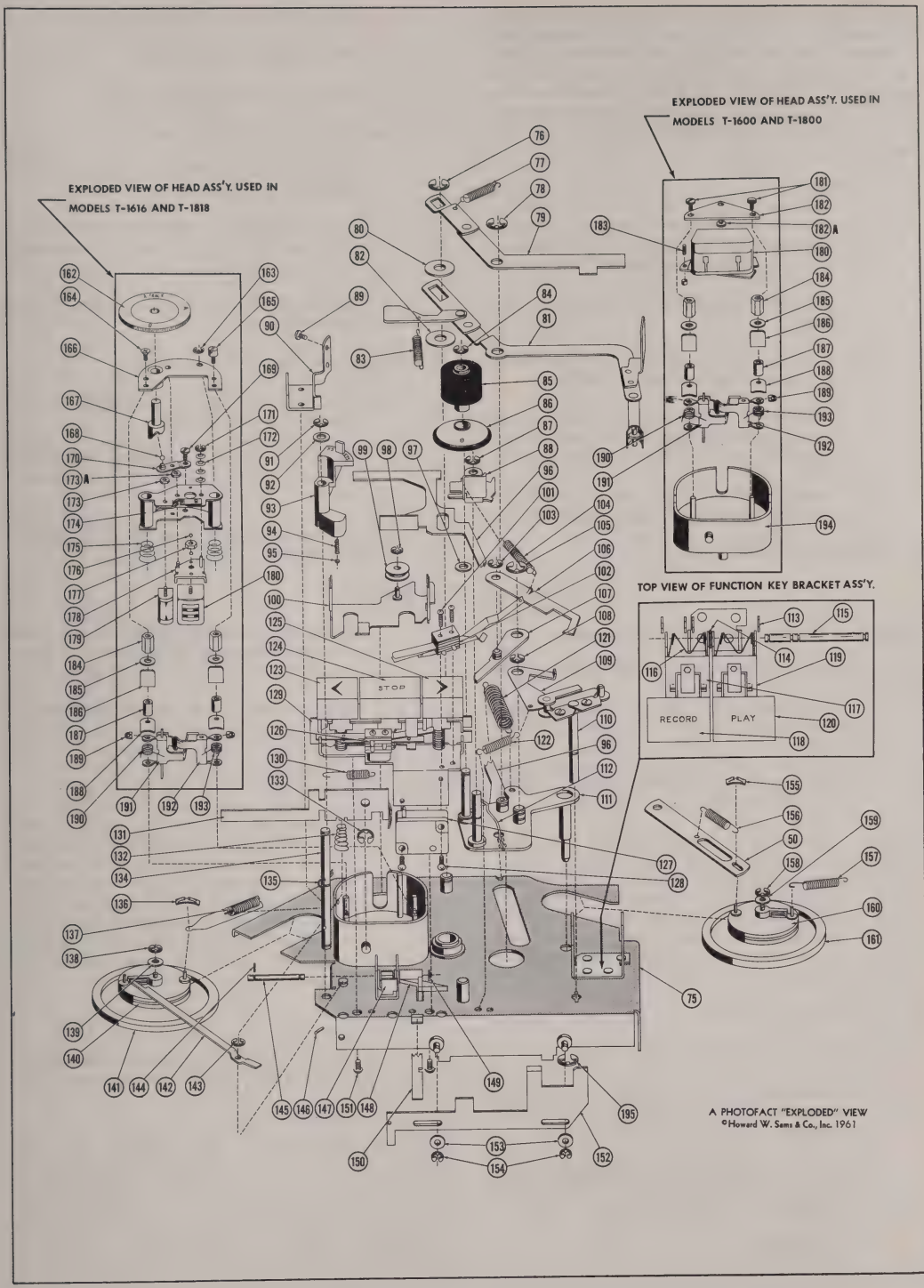
EXPLODED VIEW OF HEAD ASS'Y. USED IN MODELS T-1616 AND T-1818
EXPLODED VIEW OF HEAD ASS'Y. USED IN MODELS T-1600 AND T-1800
TOP VIEW OF FUNCTION KEY BRACKET ASS'Y.
STOP
RECORD
PLAY
A PHOTOFACT "EXPLODED" VIEW
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Fig. 19. Exploded View of Top Mechanism Plate Assembly.

hold its contacts 5 and 6 in the closed position, causing a time delay before the circuit to the stop solenoid is opened. When the capacitor C4A becomes charged, current ceases to flow through the relay coil, thus opening its contacts 5 and 6 and de-energizing the stop solenoid. Upon de-energization of the stop solenoid, the tape resumes its forward travel in the Play function.

Service Notes:

A. If the tape tab does not cause automatic replay, or if automatic replay operation is intermittent, check and/or perform the following:

1. Check tape tab and surfaces of replay contacts.
2. Tape tab may be worn out or improperly positioned. Position tab correctly.
3. Surfaces of replay contacts may not be parallel. Loosen clamping screws and realign contacts; retighten clamping screws.
4. Automatic cutoff switch pin may not press tape squarely against replay contacts.

B. The AC relay will not open if:

1. R46 resistance is too high or too low.
2. R47 resistance is too low.
3. Play lamp resistance is too low.

C. Time delay too short before replay:

1. DC relay opens with 0.75 ma or more flowing through coil.
2. Check in order of importance: R41, R43, R44, and C4A for decrease in component values.
3. DC relay coil resistance is too low. Check resistance.

D. Time delay too long before replay:

1. DC relay remains closed with 0.5 ma or less flowing through coil.
2. Check in order of importance: R41, R43, R44, and C4A for increase in component values.
3. DC relay resistance is too high. Check resistance.

MECHANICAL ADJUSTMENTS

Amplifier Function Switch Shaft Assembly

A. To set the center (Stop) or Public Address position:

1. Press Stop key and turn recorder on. Insert microphone plug into the input jack at the rear of the recorder. Slide the speaker switch to the P.A./Monitor position. Turn hex cam so that function switch assumes the position shown in Illustration A.
2. Press Play key; then press Stop key. Turn up Volume control until feedback occurs. Move the nylon function switch arm through range allowed by clearance as shown in Illustration B. If feedback stops, readjust hex cam until feedback occurs again. Leave the hex cam in this position and cement with "Phenoll."

B. To Set the Play position:

1. Press the Play key.
2. Rotate the amplifier function switch shaft assembly as shown by the arrows in Illustration C. Play lamp should light.
3. Loosen screw and move adjusting plate A until it touches stud No. 1 as shown in Illustration C. Tighten screw.
4. Press Stop key.

C. To set the Record position:

1. Press the Record key.
2. Rotate the amplifier function switch shaft assembly as shown by the arrows in Illustration D. Record lamp should light.
3. Loosen screw and move adjusting plate B until it touches stud No. 2 as shown in Illustration D. Tighten screw.
4. Press Stop key.

NOTE: If the adjusting plates A and B are adjusted too close to their respective studs 1 and 2, the pressure roller will not contact the capstan, and the tape will not move. If the plates are adjusted too far from their respective studs, the function switch will not move the proper distance, and full electrical contact will not be made.

Take-Up

If weak takeup is encountered in functions of Play or Record, adjust the nylon take-up spindle cap as follows.

The take-up spindle cap used may be one of two kinds either threaded or non-threaded. If a non-threaded cap is used, pry cap up for 1/64" clearance between it and the spindle cap. If a threaded cap is used, press cap on with its set screw in the withdrawn position. Press Play key and rotate set screw so that cap moves in direction indicated by the arrow in Illustration E. Adjust for 1/64" clearance between cap and spindle cap.

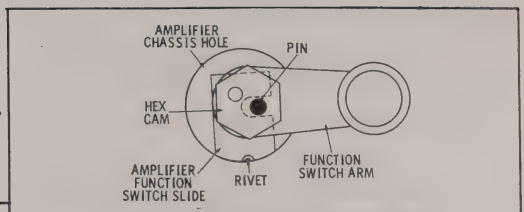

Illustration A. Stop or P. A. Position.

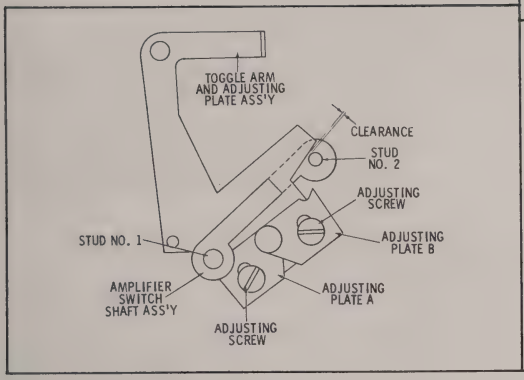

Illustration B. Stop or P. A. Position.

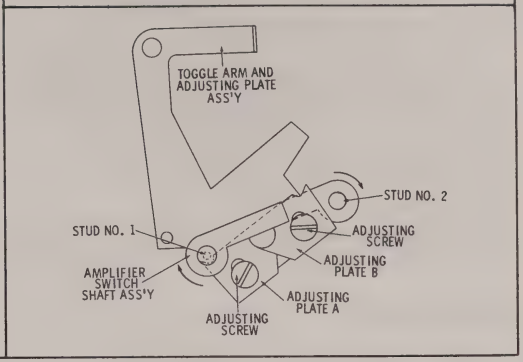

Illustration C. Play Position.

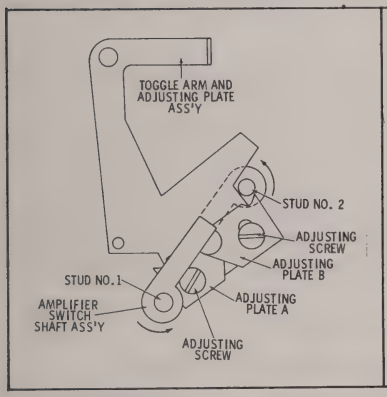

Illustration D. Record Position.

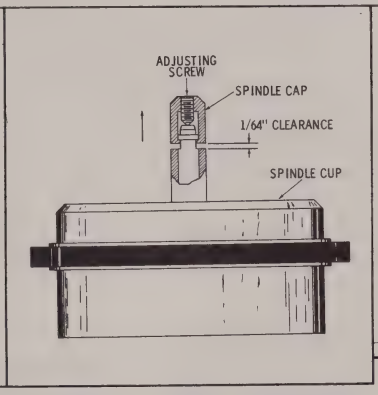

Illustration E. Take-Up Adjustment.

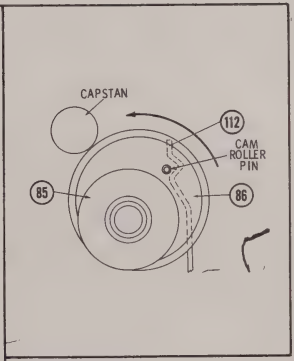

Illustration F. Recorder in Stop Function.

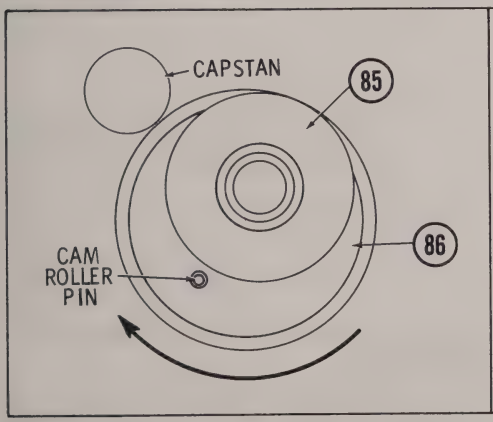

Illustration G. Engaging or Disengaging the Play and Record Functions.

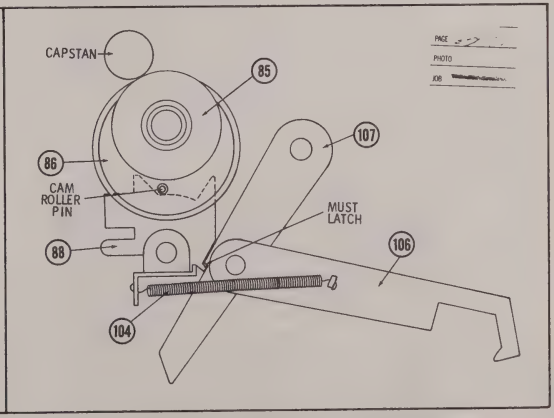

Illustration H. Recorder in Play or Record Function.

Rewind Solenoid (M8, See Fig. 2)

1. Remove recorder bottom cover and top plate (see "Disassembly Instructions").
2. Loosen solenoid mounting screws.
3. Place a spacing bar in lower rear between the side panels. This is done to position the side panels in their normal positions in place of the bottom cover.
4. Reposition the tire (25) on rewind spindle (left) by removing the tire and placing it above the top flange of the rewind spindle.
5. Turn recorder on and press Rewind key to engage solenoid.
6. Position solenoid on mounting bracket until rubber tire overlaps rewind pulley (204) approximately 1/16". Hold solenoid in this position to its mounting bracket with vise-grip pliers.
7. Check setting of solenoid in relation to the rewind pulley by alternately pressing the Stop and Rewind keys.
8. Tighten solenoid mounting screws.
9. Check solenoid arm link (237) for additional movement. This clearance is necessary.
10. Check disengaging of rewind brake. Readjust, if necessary, by bending the end of high speed transport arm (item 230, Fig. 15) toward the left.

MECHANICAL TROUBLES ASSOCIATED WITH THE PLAY AND RECORD FUNCTIONS OF THE RECORDER (REFER TO FIGS. 18 AND 19)

No Tape Movement

Check for the following possibilities:

1. Brake (45) drag on the rewind spindle (24). Spindle should rotate freely. Check for binding of mechanical components.
2. Improper tension or spacing between pressure roller (85) and capstan.
   a. Pressure roller tension spring (121) broken or disconnected. Replace or connect spring.
   b. Check "Amplifier Function Switch Shaft Assembly Adjustment" as outlined under "Mechanical Adjustments."
   c. Instant stop solenoid (262) energized. Check Instant Stop and Record Lock lever to see that contact is not made with leaf switch (102). Check front slide cam (152) to see that contact is not made with leaf switch (102). If recorder is in Record function, and microphone is plugged in, the microphone switch (normally closed position) may be holding the stop solenoid in the engaged position. Also check for binding in the stop solenoid linkage.
3. Cam roller (86) and pressure roller (85) not operating properly. The cam roller spring (112) must clear toggle link assembly (109). Interference will prevent roller (85) from contacting capstan. Cam roller spring should keep cam roller against capstan as shown in Illustration F. The cam roller should move in the direction indicated by the arrow in Illustration G whenever the Play or Record Functions are engaged or disengaged. The proper placement of the pressure roller with respect to the cam roller should appear like Illustration F with the recorder in the Stop function.
4. Idler tension spring (137 or 249) disconnected or broken, thereby not holding the high speed idler assembly (141) or low speed idler assembly (212) against motor pulley (205) and flywheel (210). Connect or replace spring.
5. Motor pulley (205) loose on its shaft. Tighten motor pulley set screw (206).
6. Take-up belt (35) stretched or not properly connected.
7. Check for oil or grease on motor pulley (205), high speed idler assembly (141), slow speed idler assembly (212), flywheel (210), and take-up belt (35). If necessary, clean with alcohol.
8. Tape wound around capstan.

Recorder Recycles Into Stop Function

Any factor that prevents latching of pawl and pivot assembly (107) with cam roller latch (88) will cause this malfunction. See Illustration H.

Check for the following:

1. Record level indicator bracket forced to the right prevents key slide bar from releasing. Reposition and tighten bracket.
2. Spring (104) broken or disconnected. Replace or connect spring.
3. Binding key slide bar.

Take-Up Reel Does Not Turn Although Tape Feeds Past the Capstan

1. Take-up belt (35) broken or off pulley (33), or flywheel (210). Replace belt, or place back on pulley or flywheel.

2. Spindle cap positioned too far down on take-up shaft. See "Take-Up Adjustment."

Take-Up Reel Stalls When Reel is Nearly Full

Grease or oil on take-up belt (35) or on take-up clutch felt (31A). Clean with alcohol. Replace felt if necessary.

Tape Overruns or Spills When Changing Functions

1. Brake arm spring (43) broken or disconnected. Connect or replace spring.
2. Brake roller springs (40 or 47) broken or disconnected. Replace or connect spring.
3. Clutch felt (31A) may be worn. Replace.
4. Check for grease or oil on all driving surfaces.

Speed Irregularities (Wow and Flutter)

In general, anything which causes a drag or slipping action other than that occuring during normal operation can cause wow and flutter.

Check for binding in the following:

1. Flywheel bearings. Check by moving high speed idler assembly (141) or low speed idler assembly (212) -- depending on which speed is selected -- and rapid forward idler assembly (161) away from the flywheel; rotate the capstan by hand. A slight drag is normally obtained from take-up belt (35).
2. Right and left reel spindles. The brakes should be disengaged or held away before the spindles are turned.
3. Pressure roller (85) bearing.
4. All idler and drive wheel bearings.
5. Motor bearings. Check by turning shaft by hand.

Check to see that:

1. Supply reel is free to rotate and is not scraping against the top plate.
2. Brakes are completely released.
3. Pressure roller (85) is making good contact with capstan.
4. Capstan and pressure roller are clean.

Check for irregularities in the following:

1. Idler wheel surfaces.
2. Pressure roller (85) surface.
3. Take-up tension. The take-up clutch is designed to slip during normal operation to compensate for the difference in the rate of rotation between a full and empty reel. Check by holding the take-up spindle while the recorder is in the Play function. The clutch action should be smooth and non-pulsating. If the surface of the take-up clutch (31A) is gummy or if the felt is worn, it should be replaced.

Insufficient Tape Take-Up

1. Clutch felt (31A) may be worn. Replace clutch felt.
2. Refer to "Take-Up Adjustment" as described under "Mechanical Adjustments."

Tape Squeal or Squeak

Tape squeal or squeak is heard as a high pitched warbling sound that accompanies recording or playback. It can be heard in quiet surroundings when listening close to the sound head and with the volume turned down. Squeal or squeak can be minimized as follows:

1. Clean head, pressure pads, and tape guides with alcohol.
2. Use a good and known name-brand tape. An inferior brand of tape with insufficient lubrication may be helped by treating it with silicone lubricant.
3. Replace pressure pads. Place thin teflon film tape over pads if necessary.
4. Slightly decrease the tension of pressure pad springs (190 and 193).

ELECTRICAL ADJUSTMENTS

Head Adjustments (Models T-1616 and T-1818)

A. To adjust head height:

1. Thread the recorder with tape.
2. Turn the head track selector knob to A position (furthest position up). Remove knob.
3. Press Play key. Place finger on roll pin in record pressure pad and pull back pressure pads. Tape should move smoothly past the heads.
4. Use a #2 Bristol wrench and adjust the record head height through the head height adjusting hole (see Fig. 20). Adjustment screw is 3/4" below hole.

5. Adjust record head height until top of upper element is exactly even with the tape as shown in Fig. 21.

6. To adjust the erase head height, turn its mounting nut (173, see Fig. 20) until the top edge of the upper erase element is even with the top edge of the tape (see Fig. 21).

B. To adjust record head azimuth:

An alignment tape, which can be obtained from Ampex or the larger radio supply houses, should be used to best align the head. The tape should have a full track recording at a frequency higher than 6,000 caps. Adjust head azimuth as follows:

1. Thread the recorder with tape.

2. Turn the head track selector knob to the 2-Track position.

3. Press Play key and adjust the record head azimuth nut (173A, see Fig. 20) for maximum output.

4. In lieu of the alignment tape, play a commercial prerecorded 4-track tape and adjust the head for maximum treble tone.

5. After adjusting the azimuth, check to see that the head height has not been disturbed. Use "Locktite" cement on the adjustment nuts.

C. Using magnetic particles to locate tracks

If there is doubt about the head adjustments, it can best be checked with magnetic powder dispersal, such as the Magna-See Kit manufactured by Reeves Soundcraft, Danbuty, Connecticut. The procedure is as follows:

1. Set head track selector knob to A position.

2. Make a constant tone recording (any frequency on a previously recorded full or half-track tape).

3. Submerge a small section of the tape as described in the Magna-See Kit instructions. The pattern should appear as shown in Fig. 22. Inexpensive pocket microscopes calibrated in thousandths of an inch can be used to measure the track width.

Head Azimuth Adjustment (T1600 – T1800)

An alignment tape, which can be obtained from Ampex or the larger radio supply houses, should be used to best align the head. The tape should have a full track recording at a frequency higher than 6,000 cps. Adjust head azimuth as follows:

1. Thread the recorder with tape.

2. Press Play key and turn adjustment screw (Item 183 on Exploded View, Fig. 19) for maximum output.

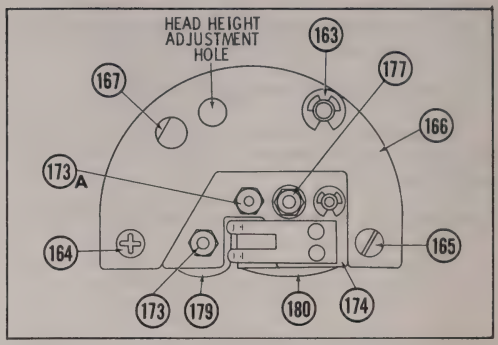

Fig. 20. 4-Track Head Assembly.

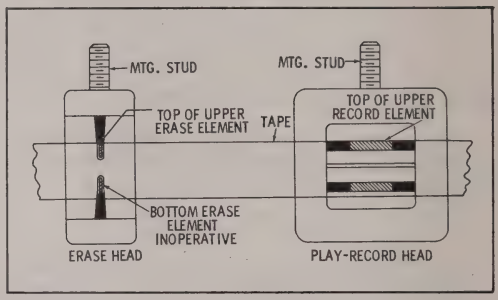

Fig. 21. Head Height Location.

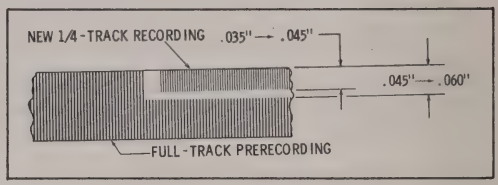

Fig. 22. Magnetic Dispersal Pattern.

3. In lieu of the alignment tape, play a previously recorded tape and adjust the head for maximum treble note. After the adjustment is made, cement the alignment screw (183) with "Locktite".

High Frequency Equalization Adjustment

An adjustment is provided in the cathode circuit of V2A (12AT7) to compensate for high frequency losses which accompany long-term head wear. This equalization has more effect upon the playback than it has upon the recording process; therefore, the adjustment is made for best results during playback.

The equalization adjustment has been properly made at the factory and should not require readjustment for at least 500 hours of use. Before any adjustment is made, the heads should be carefully cleaned with alcohol. Make the adjustment in the following manner:

1. Record signals of equal amplitude at 10 kc and 15 kc, well below (-15 db) normal level, at tape speed of 7 1/2 ips.

2. Set the Tone control to Hi-Fi position, and play back the recording. Measure the two signals at the Preamp Output jack (M22).

3. Adjust the core of high frequency equalization coil (L1) for near equal 15 kc response using 10 kc signal as reference. The core shaft is accessible (after removal of bottom cover) from the tube side of the chassis (see Fig. 9).

Hum Balancing Adjustment

Two access holes are provided in the recorder's bottom cover (near manufacturer's label) for adjustment of hum controls R3 and R4. The access hole nearest the manufacturer's label provides for the adjustment of R4. The other hole provides for the adjustment of R3. Adjust with a small bladed screwdriver.

R3 and R4 adjustments affect the hum level for monaural playback and record operations (in all models), and also the hum level for stereo playback operations from the upper channel in Models T-1616 and T-1818.

Adjust hum controls R3 and R4 as follows:

1. Turn recorder on, allow warmup, and then press Play key.

2. Turn Volume control to "0" position (minimum). To lower hum, first try reversing the power plug.

3. If hum still exists, adjust R4 for minimum hum.

4. Turn Volume control to the "10" position (maximum) and adjust R3 for minimum hum. If R3 adjusts for minimum hum at one end of its rotation, leave Volume control at maximum and readjust R4 for minimum hum.

The stereo preamp hum balancing controls R5 and R6 are used in Models T-1616 and T-1818 only (see Fig. 24) and affect the hum level for stereo playback operations from the lower channel of the stereo head. The stereo preamp adjustments have been factory adjusted for minimum hum, but in some cases, a readjustment may be necessary. No access holes are provided in the recorder's bottom cover for adjustment of these controls; therefore, it is necessary to remove the bottom cover.

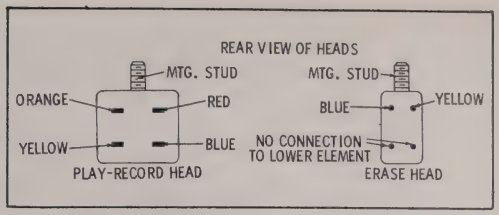

Fig. 23. Head Wire Color Coding.

Adjust R5 and R6 as follows:

1. First, perform hum balancing adjustments for R3 and R4 as specified previously.

2. Turn up the volume control on the auxiliary amplifier that is connected to the recorder's Stereo Preamp jack in a typical stereo hookup.

3. Use a small bladed screwdriver and adjust R5 and R6 for minimum hum.

Bias Current Adjustment

Make the bias current adjustment as follows:

1. Remove bottom cover from recorder as per "Disassembly Instructions".

2. Unplug 4-prong head plug (M18, Fig. 9). Wrap a length of bare hook-up wire around pin #2 of head plug, and reinsert plug into head socket.

3. Upon reinsertion of the head plug into its socket, check to see that the bare wire connected to pin #2 does not touch the chassis or any of the other plug pins.

4. Connect a VTVM (capable of accurately measuring voltage at 75 kc) between the bare wire (pin #2) and chassis ground.

5. Engage the Record function of the recorder.

6. Adjust bias/erase oscillator coil (L2) core until VTVM reads 40 VAC in Models T-1616 and T-1818, or 50 VAC in Models T-1600 and T-1800. See Fig. 9 for adjustment screw.

ELECTRICAL TROUBLES ASSOCIATED WITH THE PLAY AND RECORD FUNCTIONS OF THE RECORDER (REFER TO FIG. 27)

Weak Playback Volume or No High Frequencies

1. Check for B+ voltages as per schematic. If B+ to V3 and V4 is low, check M1, M2, R33, and R34. Replace defective components.

2. Check V3 and V4. Replace if defective.

3. Check for dirty head. Clean head with alcohol.

4. Check pressure pads for wear or improper contact.

5. Wrong type of tape or wind. Dull side of tape should be wound "in" or "A" wind.

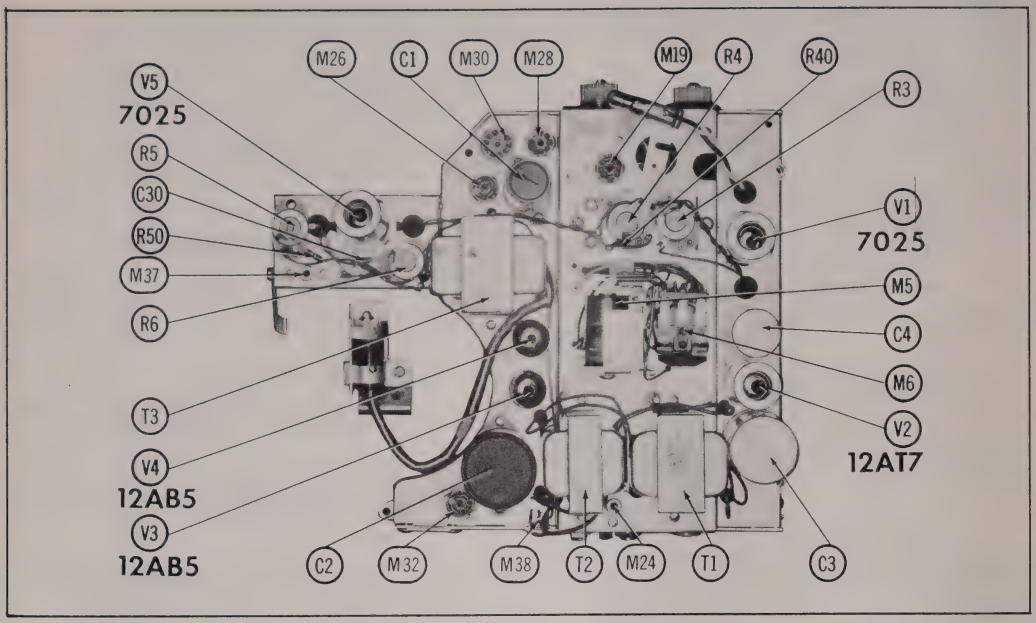

Fig. 24. Top View of Amplifier Chassis -- Model T-1616 Shown.

6. Check "Head Azimuth Adjustment" as outlined under "Electrical Adjustments."

7. Head may be worn badly or need replacement. If head is worn make "High Frequency Equalization Adjustment" as described under "Electrical Adjustments." If head wear is too great replace head as outlined under "Replacing Sound Heads."

Recorder Dead, Pilot Light Off

1. Blown fuse (M4). If recorder blows fuses repeatedly, check for B+ shorts in power supply circuits. Also check capacitor (C23) for short.

2. Check power transformer (T1) for open or short.

3. Check power cord and On-Off switch on Tone control (R1).

No Playback or Record (Play or Record Key Not Illuminated)

Amplifier function switch (M9) is not making proper electrical contact to amplifier circuits. Refer to "Amplifier Function Switch Shaft Assembly Adjustment" as outlined under "Mechanical Adjustments."

No Playback or Record (Play or Record Key Illuminated)

1. Check all tubes and associated voltages as per schematic. The trouble can be localized by monitoring the output at the Preamp Output jack (M22) in Play. If no signal is present, trouble exists in some preceding stage. Connect an audio generator to the grid of each tube of each stage to isolate the area of fault.

2. Check for defective head.

Plays Back, But Does Not Record (Play or Record Key Illuminated)

1. Check "Amplifier Function Switch Shaft Assembly Adjustment" as outlined under "Mechanical Adjustments."

2. Check recording source; microphone may be dead, or other source may be faulty.

3. Check V4 and associated voltages. Check bias erase oscillator coil (L2) and associated components.

4. Check record network (K1).

5. Check input jack (M20) and associated components in the grid input circuit to V1.

6. Check C15 and C7. Replace if defective.

Records, But Does Not Play Back (Record or Play Key Illuminated)

1. Check "Amplifier Function Switch Shaft Assembly Adjustment" as outlined under "Mechanical Adjustments".

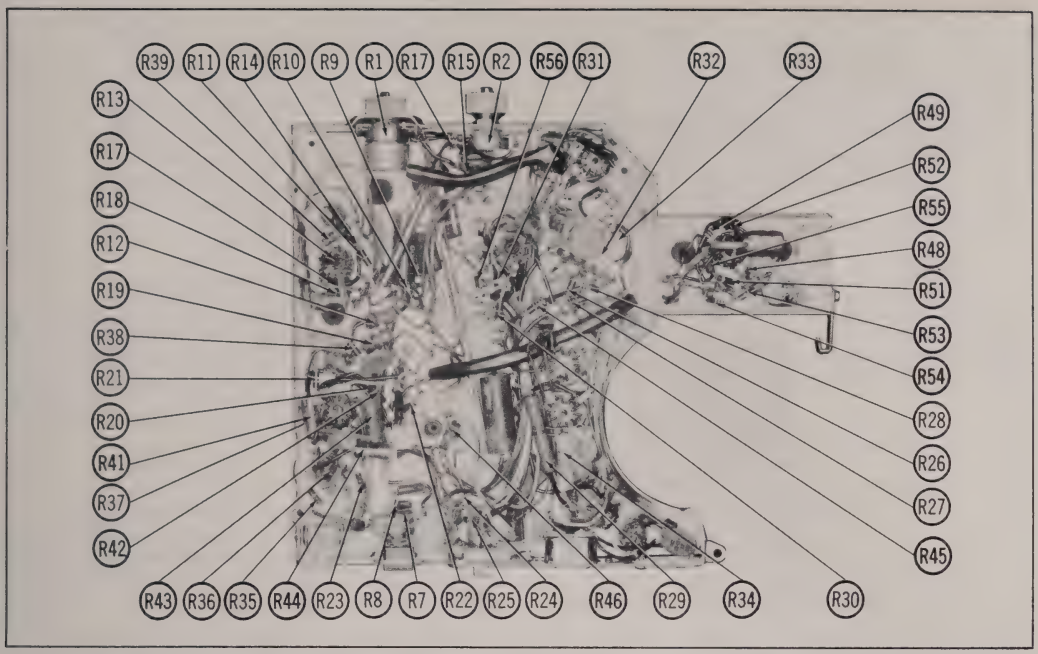

Fig. 25. Bottom View of Amplifier Chassis -- Resistor Identification (Model T-1616 Shown)

2. Monitor a recording by setting the speaker switch (M11 at the rear of the recorder to the Monitor/P.A. position. If recording can be heard, output circuits are functioning. If recording cannot be heard, check V3, T3, External Speaker jack (M23), and speaker (SP1). Check plug (M25) and socket (M24) that connects speaker.

3. Check associated components in the grid input circuit to V1.

Either Plays Back or Records, But Not Both; Key of Function Mode Illuminated, Key of Non-Functioning Mode Not Illuminated

Amplifier function switch (M9) is not making proper electrical contact to amplifier circuits. Refer to "Amplifier Function Switch Shaft Assembly Adjustment" as outlined under "Mechanical Adjustments."

Playback and Record Functions Normal, But Either the Record Key or Play Key Not Illuminated

Play or Record lamp burned out. Replace de-defective lamp.

Playback and Record Functions Normal, But Neither the Record Key Nor Play Key is Illuminated

1. **Play and Record lamps burned out. Replace defective lamps.**

2. R46 is open. Replace R46.

Weak or Distorted Record, Playback of Prerecorded Tape Normal

1. Check input jack (M20) for proper contact. Check to see that ground spring breaks contact when input plug is inserted into input jack.

2. Check microphone or other recording source for quality of signal. Failure to push plug firmly all the way into jack will cause distortion. Any accessory microphone must have a short plug to make contact to input jack "ring" spring.

3. **Check record level indicator lamp. A defective lamp may result in a record level which is too high or low.**

4. Check V4 and associated voltages. Check bias-erase oscillator coil (L2) and associated components.

5. Check record network (K1), C7, and C15. Replace defective components.

6. Make "Bias Current Adjustment" as outlined under "Electrical Adjustments."

Record Level Indicator Inoperative or Operation Faulty. Records and Plays Back Properly

1. Check for defective lamp.

2. Check R26, R27, C17, and R28. Replace defective components.

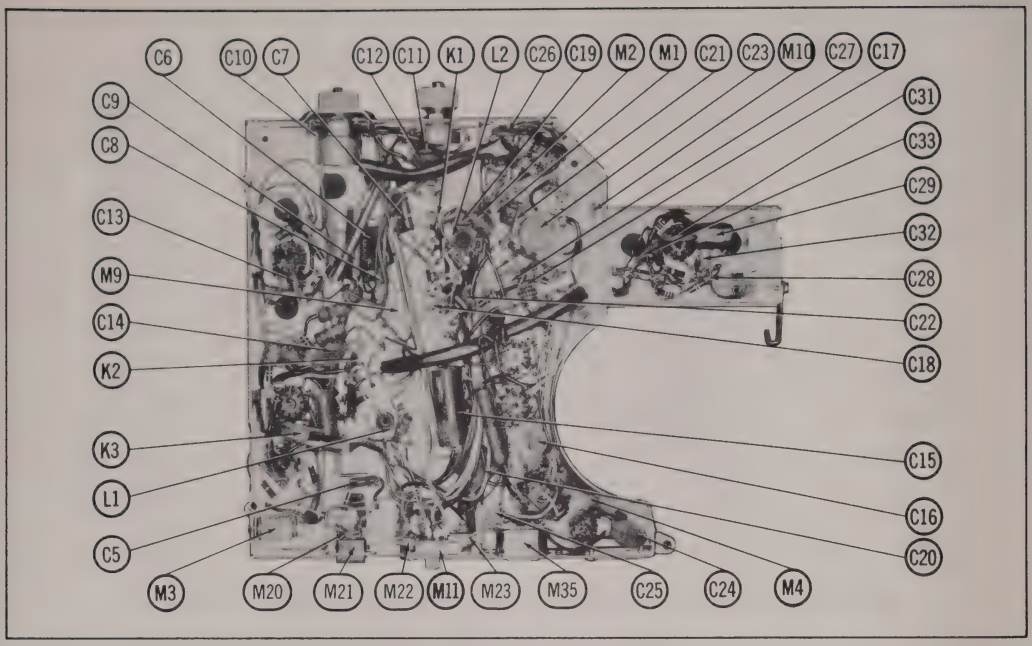

Fig. 26. Bottom View of Amplifier Chassis -- Capacitor and Other Component Identification (Model T-1616 Shown).

3. Excessive hum or oscillation of amplifier may cause the lamp to glow continuously. Check to see if metal shield is in place over input jack (M20).

Hum in Record or Playback

1. Check all tubes for heater-to-cathode leakage. Replace defective tubes.

2. Check hum controls R3 and R4 (used in all models), and R5 and R6 (used in Models T-1616 and T-1818 only). Refer to "Hum Balancing Adjustments" as described under "Electrical Adjustments."

3. Check B+ filter capacitors C2, C3, and C4.

4. Keep recorder away from hum fields such as fluorescent lamps, amplifiers, transformers, etc.

5. Make a recording from another microphone or external source to see if hum is inherited from the recording source.

Weak or No Erase, Records Over Previous Recordings

1. Check for dirt on erase head element. Clean with alcohol. Check pressure pads.

2. Check V4 and associated voltages. Check bias-erase oscillator coil (L2) and associated components.

3. Check "Bias Current Adjustment" as outlined under "Electrical Adjustments."

4. Check erase head for open or short.

Excessive Erase, Tape Burns When Instant Stop Is Used in Record Function

Refer to "Bias Current Adjustment" under "Electrical Adjustments."

Microphonic Noises

Microphonic noises usually develop in the first stages of an amplifier where the sensitivity is greatest, but can develop in other stages. If microphonic noises are encountered during monaural playback only (Models T-1600 and T-1800), or during stereo or monaural playback (upper channel of in-line head used in Models T-1616 and T-1818), check V1. If V1 is not microphonic, check remaining tubes V2, V3, and V4. Dress C7 to clear edges of switch (M9) shield. Dress V1A grid wire (pin 2) to clear C9. Dress C5 to clear input jack shield.

If microphonic noises are encountered during stereo playback from lower channel of in-line head used in Models T-1616 and T-1818, check V5. If V5 is not microphonic, check tubes in the auxiliary amplifier which is connected to the recorder's Stereo Preamp jack in a typical stereo hook-up.

Excessive Tape Hiss

1. Check for sufficient recording level by comparing to a prerecorded tape.

2. Try a fresh high quality tape. Tape may be worn.

3. Check V4 and associated voltages. Check bias-erase oscillator coil (L2) and associated components.

4. Check "Bias Current Adjustment" as outlined under "Electrical Adjustments". A poor erase or bias waveform can cause a low signal-to-noise ratio in the recorded signal.

5. Check automatic demagnetization circuit which operates by shorting C7 across the play-record coil at the termination of the Record function. The .22 mfd capacitor resonates the Record head to provide a decaying demagnetization transient.

6. Head may be microphonic. Replace head.

CLEANING

The majority of defects other than wear or breakage, can be traced to dirty surfaces. The heads (179 or 180), capstan, pressure roller (85), and cam roller (86) are subject to an accumulation of tape residue, which is worn off the tape as it passes these parts. This accumulation should be periodically removed since it will cause faint recordings and poor playback. Wipe off the above surfaces carefully with a clean cloth. If dirt is caked or hard and will not come off with a dry cloth, dampen cloth slightly with alcohol.

LUBRICATION

All moving parts of the recorder were permanently lubricated at time of manufacture. Under normal use further lubrication should not be required. In heavy-duty service, the following parts should be lubricated once a year with a drop or two of #10 motor oil.

1. The top and bottom motor bearings.

2. The top and bottom flywheel (210) bearings.

3. Pressure roller (85) bearings.

4. All idler and drive wheel bearings.

5. The reel spindle bearings.

The basic rule is -- do not over-lubricate. Oil must be kept off all rubber idlers, belts, and periphery of flywheel, and off parts that might transfer oil to them. Always wipe excess lubricant from parts that have been lubricated.

REPLACING SOUND HEADS

Make sure that all other possible sources of trouble associated with the Play and Record functions of the recorder have been eliminated before replacing the heads. Check the following:

1. Heads may be dirty. Clean with alcohol.

2. Pressure pads may be worn and need replacement, or the pads may not be pressing the tape squarely against the heads.

3. Trouble in amplifier.

4. Loose connections in head cable.

Replacement of Heads in Models T-1616 and T-1818

There are two heads used in Models T-1616 and T-1818: an in-line stereo head and a separate erase head. The in-line stereo head may be used to:

1. Record and playback monaural 2 (or twin) - track tapes.

2. Record and playback monaural 4-track tapes.

3. Playback prerecorded stereo 2-track tapes.

4. Playback prerecorded stereo 4-track tapes.

The erase head erases the tape of any signal prior to recording monaural 2- or 4-track tapes.

A. To remove heads from recorder (refer to Figs. 19 and 20).

1. Remove head covers (2 and 3, Fig. 8).

2. Remove head track selector knob (162).

3. Remove bottom cover, top cover plate (15, Fig. 8) left side panel, and front panel, from recorder as per "Disassembly Instructions."

4. Remove head plug (M18) and lower channel stereo input plug (M36) from amplifier chassis (see Fig. 9).

5. Remove following: crosslock screw (164), "E" ring (163), and stud screw (165).

6. Lift and remove bushing cover plate (166).

7. Lift head sliding assembly (174) straight up and remove. The head connecting cables should be aided up at the same time to prevent damage to the connecting wires. Any side motion of the slide assembly will cause it to bind. Upon removal of the head sliding assembly, be careful not to lose the small steel ball (168) located on bracket (170) in back of the erase head (179).

B. Replacing record head (180) only.

If only the record head is defective, it can be replaced without further disassembly. Remove record head as follows:

1. Pry up cable retaining clamp behind record head.

2. Disconnect wires from the head connecting pins by grasping each connector with a pair of long nose pliers and pulling back. Note wire color coding as shown in Fig. 23.

3. Remove record head mounting nut (177), see Fig. 20. Remove head from head sliding assembly. To install the replacement head reverse the disassembly procedure.

C. Replacing erase head (179) only.

Remove the erase head as follows:

1. Pry up cable retaining clamp behind record head.

2. Disconnect wires from head connecting pins. The wire connections are crimped into the erase head pins, and therefore need to be cut in order to be removed. Note wire color coding as shown in Fig. 23. After wires are cut, strip the insulation from the ends of the wires in readiness for connecting to the replacement head.

3. Remove erase head mounting nut (173), see Fig. 20. Remove head from head sliding assembly. To install the replacement head reverse the disassembly procedure.

After the defective record and/or erase heads have been replaced, completely reassemble the head assembly into the head shield cup and connect the cable connections to their respective sockets on the amplifier chassis. Make sure that the cables are routed away from all moving parts. Press down firmly on the track selector cam shaft (167) to see that the head slide assembly is free to move up and down. If the head cables or cable clamp press against the head cup, the assembly will not move freely. Align head height and azimuth as outlined under "Electrical Adjustments."

Replacement of Heads in Models T-1600 and T-1800

The head used in Models T-1600 and T-1800 is a combination play-record-erase head. Its use provides for the record and playback of monaural 2 (or twin)-track tapes. Replace head as follows (refer to Exploded View, Fig. 19):

A. To remove head from recorder

1. Remove head covers (2 and 3, Fig. 8).

2. Remove bottom cover, top cover plate (15, Fig. 8), left side panel, and front panel, from recorder as per "Disassembly Instructions."

3. Remove head plug (M18) from amplifier Chassis (see Fig. 9).

4. Remove screws (181) and head spring retainer (182).

5. Lift head and brass alignment plate from head shield cup.

B. Replacing head

1. Pry head from brass alignment plate. Note position of location pins.

2. Install the replacement head over the location pins in the alignment plate and press into place.

3. Replace alignment plate into head cup. The two brass pivot studs should engage the two holes in the plate.

4. Replace head retaining spring.

After the head has been completely reassembled, connect the head cable plug into its socket on the amplifier chassis. Make sure that the cable is routed away from all moving parts. Align head azimuth as described under "Electrical Adjustments."

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Used in Models
1	A14-14368	Screw, Head Cover	All
2	C2-17206	Head Cover Casting	All
3	B2-14255	Clean-Out Cover Casting	All
4	A14-14969	#3-48 Phillips Flat Head Screw	All
5		Escutcheon	All
6	A3-14851	Bracket, Back Space Bar	All
7	A13-14996	Spring, Back Space	All
8	B15-14930	Back Space Bar	All
9	A9-14956	Tape Index Counter	All
10	A30-17107	Index Counter Drive Belt	All
11	A14-14974	#3-48 x 5/8" Phillips Flat Head Screw	All
12		Rewind Post Assembly	All
13		Replay Post Assembly	All
14	A9-14370	Screw, #6-32 x 7/32"	All
15	C3-14854	Top Cover Plate	All
16		Rewind Post Insulator	All
17		Replay Post Insulator	All
18	SP-3422	#3-48 Hex Nut	All
19	A14-14973	#3-48 x 5/16" Rd. Head Machine Screw	All
20	A14-14972	#3-48 x 1/4" Rd. Head Machine Screw	All
21	A1-17132	Cut-Off Switch Assembly	All
22	A14-14722	Screw, Tape Cut-Off Switch Mtg.	All
23	A15-14461	Spindle Cap	All
24	A1-17150	Rewind Spindle Ass'y. (Includes Item 25)	All
25	A30-17103	Spindle Cup Tire	All
26	A8-14441	Nylon Washer	All
27	A15-14461	Spindle Cap	All
28	A1-17254	Spindle Cup and Rapid Forward Drum Ass'y. (Includes Item 29)	All
29	A30-17103	Spindle Cup Tire	All

MECHANICAL PARTS LIST (Cont'd)

Ref. No.	Part No.	Description	Used in Models
30	A8-14441	Nylon Washer	All
31	A1-14513	Clutch Plate and Felt Ass'y.	All
31A	A9-7817	Felt, Take-Up Clutch	All
32	A13-7617	Spring, Clutch Plate	All
33	A1-14212	Take-Up Pulley Ass'y.	All
34	A9-7520	"E" Ring	All
35	A30-7809	Take-Up Belt	All
36	A9-12670	"E" Ring, 1/4" Shaft	All
37	A3-10370	Washer	All
38	A1-17151	Brake Arm and Pin Ass'y. -- Right	All
39	A15-14943	Brake Arm Roller	All
40	A13-14415	Brake Roller Leaf Spring	All
41	A9-13200	"E" Ring	All
42	A3-14828	Rapid Transport Brake Release Lever	All
43	A13-14127	Spring, Brake Arm	All
44	A9-12670	"E" Ring, 1/4" Shaft	All
45	A1-14214	Brake Arm and Pin Ass'y. -- Left	All
46	A15-14943	Brake Arm Roller	All
47	A13-14415	Brake Roller Leaf Spring	All
48	A3-14833	Rapid Forward Linkage Arm	All
49	A9-11888	"E" Ring, 3/16" Shaft	All
50	A3-14832	Rapid Forward Idler Arm	All
51	A9-12670	"E" Ring, 1/4" Shaft	All
52	A3-14830	Rewind Arm Interlock Lever	All
52A	A13-14127	Spring	All
53	A4-14919	Rewind Spindle Shaft	All
54	A4-14907	Rewind Arm Pin	All
55	A4-14355	Spacer	All
56	B3-14276	Rewind Arm	All
57	A9-11888	"E" Ring, 3/16" Shaft	All
58	A9-13199	"E" Ring, 1/8" Shaft	All
59	A17-14577	#8-32 Set Screw	All
60	A9-11888	"E" Ring, 3/16" Shaft	All
61	A3-14831	Rewind Toggle Arm	All
62	A13-14993	Spring, Rewind Arm	All
63	A9-13199	"E" Ring, 1/8" Shaft	All
64	A9-6501	"E" Ring, 3/32" Shaft	All
65	A4-14884	Pin, Pivot Link	All
66	A3-14835	Clevis, Rapid Forward Linkage Arm	All
67	A13-14994	Spring, Torsion	All
68	A4-14885	Pivot Pin, Rapid Forward Coupling Lever	All
69	A15-14941	Rapid Forward Linkage Arm	All
70	A9-6501	"E" Ring, 3/32" Shaft	All
71	A15-14942	Rapid Forward Linkage Arm	All
72		Spring	All
73	A3-17269	High Speed Arm	All
74	A14-12187	#8-32 Truss Head Sems Screw	All
75	C1-17141	Top Mechanism Plate Ass'y.	T-1600, T-1800
		Top Mechanism Plate Ass'y.	T-1616, T-1818
76	A9-12670	"E" Ring, 1/4" Shaft	All
77		Spring	All
78	A9-12670	"E" Ring, 1/4" Shaft	All
79	A1-17137	Toggle Link Assembly	All
80	TR-7513	Washer	All
81	B1-17140	Instant Stop Link Ass'y.	All
82	TR-7513	Washer	All
83	A13-14127	Spring	All
84	A9-11888	"E" Ring, 3/16" Shaft	All
85	A30-14955	Pressure Roller and Bearing	All
86	A1-17152	Pressure Roller Cam Ass'y.	All
87	A9-11888	"E" Ring, 3/16" Shaft	All
88	A1-17263	Cam Roller Latch Weld Ass'y.	All
89		Screw, Head Lead Guard Mtg.	All
90	A3-14868	Head Lead Guard	All
91	A9-11888	"E" Ring, 3/16" Shaft	All
92	A181-2	Fibre Washer	All
93	A15-14933	Two Speed Knob	All
94	A13-12124	Spring	All
95	A9-10874	Steel Ball	All
96	B3-14713	Brake Lever	All
97	A8-14441	Nylon Washer	All
98	A9-7520	"E" Ring	All
99	A15-11783	Detent Roller	All
100	A1-17156	Tape Guard Plate Ass'y.	All
101		Screw, Leaf Switch Mtg.	All
102	B141-34	Leaf Switch	All
103	A9-11888	"E" Ring, 3/16" Shaft	All
104	A13-14127	Spring	All
105	A9-12670	"E" Ring, 1/4" Shaft	All
106	A3-14818	Pawl Release Link	All
107	A1-17144	Pawl and Pivot Ass'y.	All
108	A9-12670	"E" Ring, 1/4" Shaft	All
109	A1-17176	Toggle Arm and Adjusting Plate Ass'y.	All
110	A1-17135	Amplifier Switch Shaft Ass'y.	All
111	A1-17136	Pressure Roller Arm Ass'y.	All
112	A13-14991	Cam Roller Spring	All
113	A9-11888	"E" Ring, 3/16" Shaft	All
114	A181-2	Fibre Washer	All
115	A4-14891	Function Key Shaft	All
116	A13-14992	Spring, Key Return	All
117	A1-17147	Record Key Bracket Ass'y. (Includes Item 118)	All
118	B15-14932	Record Key	All
119	A1-17153	Play Key Bracket Ass'y. (Includes Item 120)	All
120	B15-14931	Play Key	All
121	A13-14998	Spring, Pressure Roller Arm	All
122	A13-14127	Spring	All
123	B15-14927	Rewind Key	All
124	B15-14928	Stop Key	All
125	B15-14929	Rapid Forward Key	All
126	B141-33	Leaf Switch	All
127	A141-35	Microswitch	All
128	A14-17102	Screw, Microswitch Mtg.	All
129	B197-21	Control Switch Subassembly (Includes Items 101, 102, 123, 124, 125, 126, 127, and 128)	All
130	TR-7605	Spring	All
131	A3-17258	Cutoff Link Arm	All
132		Spring	All
133	A9-11888	"E" Ring, 3/16" Shaft	All
134	A4-14323	Two Speed Arm Shaft	All
135		Cotter Pin	All
136	A9-10960	Speed Nut	All
137	A13-14177	7 1/2 ips Idler Spring Hook	All
138	A9-11888	"E" Ring, 3/16" Shaft	All
139	A8-10472	Washer	All
140	A1-14204	Idler Slide Ass'y.	All
141	B1-14207	Idler Ass'y.	All
142	A3-14282	Speed Change Arm (7 1/2 ips)	All
143	A9-11888	"E" Ring, 3/16" Shaft	All
144	A9-13199	"E" Ring, 1/8" Shaft	All
145		Rapid Forward Actuator and Intermediate Cutoff Link Shaft	All
146	A9-14383	Roll Pin	All
147	A3-17261	Intermediate Cutoff Link	All
148	A15-14935	Rapid Forward Slide Actuator	All
149	A9-13199	"E" Ring, 1/8" Shaft	All
150	A3-14834	Rapid Forward Slide Link	All
151	A14-17112	#8-32 Phillips Rd. Head Machine Screw	All
152	A3-14823	Function Key Interlock Slide Cam	All
153		Washer	All
154	A9-7520	"E" Ring	All
155	A9-10960	Speed Nut	All
156	A13-14421	Rapid Forward Idler Spring	All
157	A13-14127	Spring	All
158	A9-11888	"E" Ring, 3/16" Shaft	All
159	A8-10472	Washer	All
160	A1-14204	Idler Slide Ass'y.	All
161	B1-14207	Idler Ass'y.	All
162	A1-17253	Head Track Selector Knob Ass'y.	T-1616, T-1818
163	A9-13200	"E" Ring	T-1616, T-1818
164		Crosslock Screw	T-1616, T-1818
165		Stud Screw	T-1616, T-1818
166	A1-17236	Bushing Cover Plate	T-1616, T-1818
167	A1-17234	Track Selector Cam Shaft Ass'y.	T-1616, T-1818

MECHANICAL PARTS LIST (Cont'd)

Ref. No.	Part No.	Description	Used in Models
168	A9-5805	Steel Ball, 3/32"	T-1616, T-1818
169	A14-17208	Screw, #3-56 Slotted Pan Hd.	T-1616, T-1818
170	A1-17230	Cam Adjust Lever and Ball Retainer Ass'y.	T-1616, T-1818
171	A9-6501	"E" Ring, 3/32" Shaft	T-1616, T-1818
172	A13-17197	Spring Washer	T-1616, T-1818
173	A4-17211	#4-40 Nut, Erase Head Mtg.	T-1616, T-1818
173A	A4-17212	#2-56 Nut, Azimuth Adjust	T-1616, T-1818
174	A1-17232	Head Sliding Ass'y.	T-1616, T-1818
175	A13-17196	Spring	T-1616, T-1818
176	A9-17223	Steel Ball, 1/16"	T-1616, T-1818
177	A4-17213	Nut. Record Head Mtg.	T-1616, T-1818
178	A1-17233	Bracket, Head Mtg.	T-1616, T-1818
179	B161-7	Erase Head	T-1616, T-1818
180	B161-6	Play-Record Head	T-1616, T-1818
	C161-1	Play-Record-Erase Head	T-1600, T-1800
181	A14-1057	#3-48 x 1/8" Screw	T-1600, T-1800
182	A13-14320	Head Spring Retainer	T-1600, T-1800
182A	A16-14464	Head Insulator	T-1600, T-1800
183	TR-7429	#4-48 Set Screw (Head Azimuth Adjust)	T-1600, T-1800
184		Hex Nut	All
185	A8-17225	Washer	All
186	A3-7147	Top Tape Guide	All
187		Tape Guide Spacer	All
188		Bottom Tape Guide	All
189	A9-13199	"E" Ring, 1/8" Shaft	All
190	A13-7610	Record Pad Spring	All
191	A1-17177	Record Pressure Pad Ass'y.	T-1600, T-1800
	A1-17228	Record Pressure Pad Ass'y.	T-1616, T-1818
	A9-7818	Record Pressure Pad Felt	T-1600, T-1800
	A9-17227	Record Pressure Pad Felt	T-1616, T-1818
192	A1-7916	Erase Pressure Pad Ass'y.	T-1600, T-1800
	A1-17229	Erase Pressure Pad Ass'y.	T-1616, T-1818
	A9-7818	Erase Pressure Pad Felt	T-1600, T-1800
	A9-17227	Erase Pressure Pad Felt	T-1616, T-1818
193	A13-7615	Erase Pad Spring	All
194	B1-14197	Head Shield Ass'y. (Part of Top Mechanism Plate Ass'y., Item 75)	T-1600, T-1800
195		"E" Ring	All
196	A4-14877	Pin, Link to Solenoid Tongue	All
197	A14-14394	Screw, Motor Mounting	All
198		Split Washer	All
199	A30-14023	Motor Vibration Isolator	All
200	A9-7442	Stop Nut, Motor Mount	All
201		Washer	All
202	A30-17121	Motor Vibration Isolator	All
203	A9-12315	Grip Ring	All
204	A15-14950	Rewind Pulley	All
205	A4-14914	Motor Pulley	All
206	A17-7431	#8-32 Set Screw	All
207	TR-7513	Washer	All
208	C3-17117	Clutch Release Link	All
209	A1-17139	Take-Up Actuating Lever Ass'y.	All
210	A1-17155	Flywheel Ass'y.	All
211	A9-17120	Retaining Clip	All
212	B1-14206	Slow Idler Ass'y.	All
213	TR-7605	Spring, High Speed Plunger	All
214	P-1428	Washer	All
215	TR-7513	Washer	All
216	A13-17166	Spring, High Speed Lever Return	All
217	A14-17111	#8 Hex Head Self-Tapping Screw	All
218	A1-17145	Knob Support Bracket Ass'y.	All
219	B15-14925	Knob, Volume Control	All
220	B15-14926	Knob, Tone Control	All
221	A9-12670	"E" Ring, 1/4" Shaft	All
222		Intermediate Drive Gear	All
223	TR-7513	Washer	All
224	A13-14989	Spring, Control Knob	All
225	A9-12670	"E" Ring, 1/4" Shaft	All
226	TR-7513	Washer	All
227	A13-14989	Spring, Control Knob	All
228		Intermediate Drive Gear	All
229	A9-12670	"E" Ring, 1/4" Shaft	All
230	A1-17138	High Speed Transport Lever	All
231	A1-17130	High Speed Solenoid and Link Ass'y.	All
232	A4-14877	Pin, Link to Solenoid Tongue	All
233	A13-17164	Spring, High Speed Plunger Dampening	All
234	A30-17100	Grommet	All
235	B3-14810	Bracket, High Speed Solenoid Mtg.	All
236	A14-14425	#10-24 x 3/8" Screw	All
237	A15-14939	High Speed Solenoid Arm	All
238	A9-13199	"E" Ring, 1/8" Shaft	All
239	A9-11888	"E" Ring, 3/16" Shaft	All
240	A9-14957	Motor	All
241	A9-12670	"E" Ring, 1/4" Shaft	All
242		Grommet	All
243	A3-14499	Motor Fan	All
244	TR-7513	Washer	All
245	A9-12670	"E" Ring, 1/4" Shaft	All
246	A15-14446	Slow Speed (3 3/4 ips) Switch Cam	All
247	A9-11888	"E" Ring, 3/16" Shaft	All
248	A1-14205	Slow Speed Idler Slide Ass'y.	All
249	A13-14418	Slow Speed Idler Spring	All
250	A8-10472	Washer	All
251	A9-11888	"E" Ring, 3/16" Shaft	All
252	A9-10960	Speed Nut	All
253	A184-16	Tri-Mount Stud, Spring Retainer	All
254	A3-14282	Speed Change Arm (3 3/4 ips)	All
255	A9-11888	"E" Ring, 3/16" Shaft	All
256	A1-14242	Amplifier Switch Cam and Pin Ass'y.	All
257	A1-14243	Amplifier Function Switch Arm Ass'y.	All
258	A9-11888	"E" Ring, 3/16" Shaft	All
259	A14-14622	#6-32 x 1/4" Phillips Rd. Head Screw	All
260	A9-11888	"E" Ring, 3/16" Shaft	All
261	A8-1428	Washer	All
262	A1-17131	Instant Stop Solenoid and Link Ass'y.	All
263	A4-14877	Pin, Link to Solenoid Tongue	All
264	A15-14934	Instant Stop Solenoid Arm	All
265	A30-17100	Grommet	All
266	A3-14809	Bracket, Instant Stop Solenoid Mtg.	All

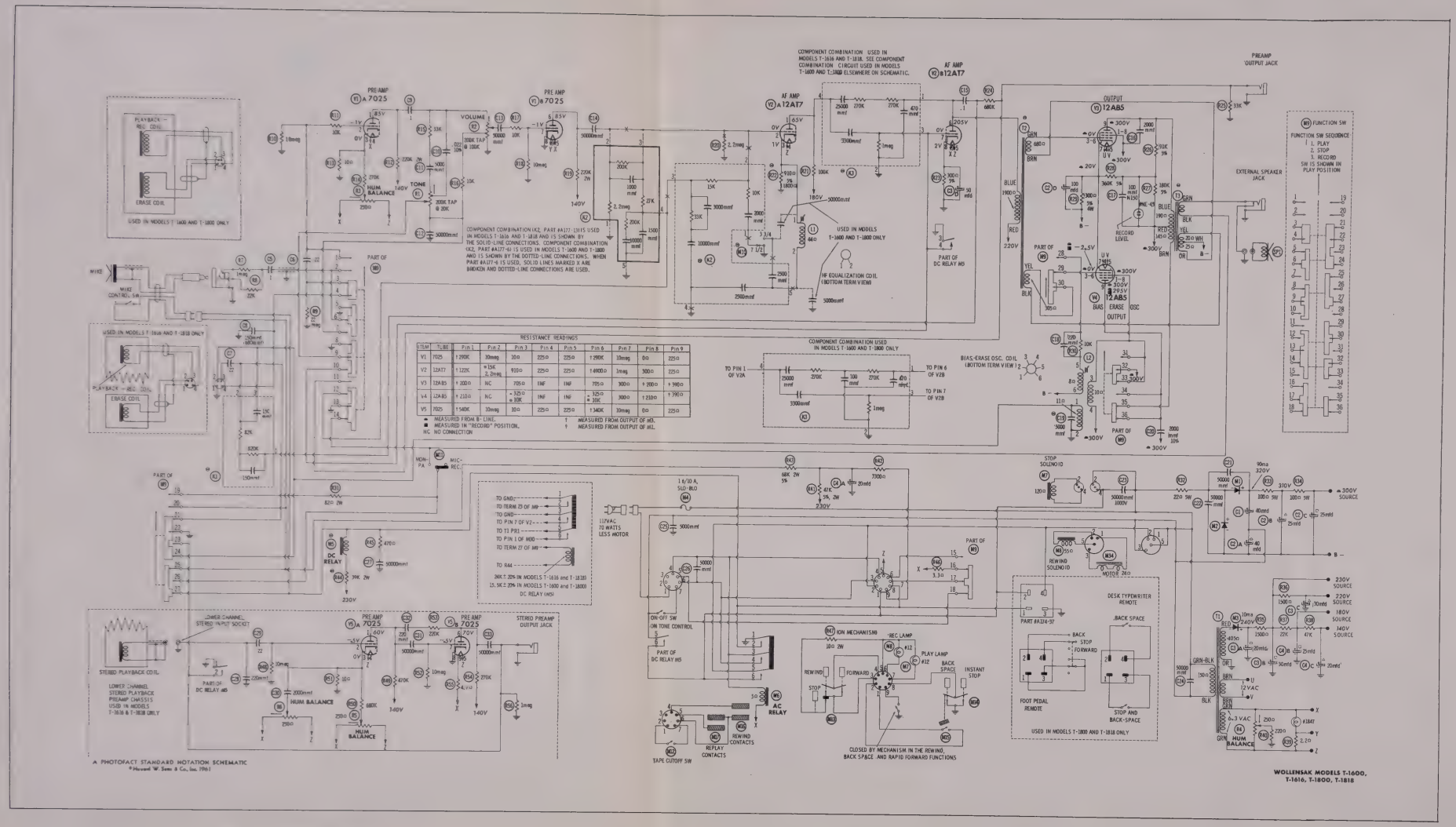

Fig. 27. Schematic Diagram.

SCHEMATIC NOTES

General

1. DC voltage measurements taken with VTVM. AC voltages measured at 5000 ohms per volt with VOM.
2. Measured values are from tube socket pin to common negative unless otherwise stated.
3. Line voltage maintained at 117 volts AC for voltage readings.
4. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
5. Resistance measurements taken with a VOM.
6. DC coil resistance values under one ohm not shown on schematic diagram.
7. Socket connections are shown as bottom views.
8. Volume and Tone controls at minimum, proper output load connected.
9. Arrows on controls indicate clockwise rotation (control viewed from shaft or accessible end).
10. Numbers assigned to switch contacts, plugs, and sockets are used to facilitate circuit tracing, and may not necessarily be found on the unit.
11. When a reference number is accompanied by note symbol (Θ), refer to the "Electrical Parts List" for alternate value or application.

Voltage and Resistance Measurements

1. The measurements listed are representative for Models T-1616 and T-1818, but will generally apply for Models T-1600 and T-1800 also. A voltage and/or resistance measurement for Models T-1600 and T-1800 may differ from the ones listed due to the differences in circuit component values used. Therefore, whenever the note symbol (Θ) accompanies a reference number, refer to the "Electrical Parts List" for the alternate value. This alternate value may or may not affect the resultant voltage and/or resistance reading.
2. All measurements are taken in "Play" position unless otherwise designated.
3. ▲ Measured from B-line.
4. ■ Measured in "Record" position.
5. † Measured from output of M3.
6. ‡ Measured from output of M1.
7. NC No Connection.

ELECT. PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Preamplifier	7025	V4	Output-Bias Osc.	12AB5
V2	AF Amplifier	12AT7	V5	Stereo Preamp.	7025
V3	Output	12AB5			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA WOLLENSAK PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	40	200	A119-19	AFH1-25	A0290		TMS-1450	TVL-1519	
C2A	▰40	200	A119-9					TVLS-4608.6*	
B	▲25	350							
C	■25	350							
D	20	35							
C3A	▰20	300	A119-18					TVLS-3625*	
B	■30	300						TVA-1206	
C	▲30	300							
D	50	10							
C4A	20	250	A119-17		C0132	FP217	TMT-3220	TVL-3532	
B	■25	250				TC55			
C	▲20	250							

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	EMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	.1 100V		P288N-1	DF-104	CUB2P1	DP-2-104	GEM-201	2TM-P10
C6	.22 100V		P288N-22		CUB2P22	DP-3-224	GEM-2022	2TM-P22
C7	.22 100V		P288N-22		CUB2P22	DP-3-224	GEM-2022	2TM-P22
C8	150	(680) †	DI-150	DD-151	LI0T15	CCD-151	B-315	10TS-T15
C9	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C10	.022 100V 10%		V84C2S22-10%		PM4S22	DP-1-223	GEM-1612	4TM-S22
C11	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C12	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50
C13	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50
C14	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50
C15	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C16	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C17	100 N150	#B112-1				*		10TCP-T10
C18	220		DI-220	DD-221	LI0T22	CCD-221	B-322	10TS-T22
C19	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C20	2000 10%		1469-002		5R5D2	CM-19B-202K	MCB457	MS-22
C21	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50
C22	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50
C23	50000 1000V		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50
C24	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	EMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C25	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C26	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50
C27	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50
C28	220		DI-220	DD-221	LI0T22	CCD-221	B-322	10TS-T22
C29	.22 100V		P288N-22		CUB2P22	DP-3-224	GEM-2022	2TM-P22
C30	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C31	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50
C32	220		DI-220	DD-221	LI0T22	CCD-221	B-322	10TS-T22
C33	50000		BPD-05	DD-503	CUB6S5	6DP-3-503	GP150	5HK-S50

\# Wollensak Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
† Alternate Value.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA WOLLENSAK PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	200K	½	A140-14					Tone
	20K Tap							
B	Switch							Power Off-On
R2	200K	½	A140-15	BT-47				Volume
	100K Tap							
R3	250Ω		A140-13					Hum Balance
R4	250Ω		A140-13					Hum Balance
R5	250Ω		A140-13					Hum Balance
R6	250Ω		A140-13					Hum Balance

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R7	1meg			
R8	22K			
R9	22meg			
R10	10meg			
R11	10K			
R12	220K 2W			
R13	10Ω			
R14	270K			
R15	33K			
R16	10K			
R17	10K			
R18	10meg			
R19	220K 2W			
R20	2.2meg			
R21	100K			
R22	910Ω			(1800Ω)

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R23	300Ω			
R24	680K			
R25	33K			
R26	91K			
R27	180K			
R28	360K			
R29	300Ω 4W	PW5-300	5W-SQ-300	
R30	10K			
R31	82Ω 2W			
R32	22Ω 5W	PW5-22	5W-SQ-22	
R33	100Ω 5W	PW5-100	5W-SQ-100	
R34	100Ω 5W	PW5-100	5W-SQ-100	
R35	1500Ω			
R36	1500Ω			
R37	22K			
R38	47K			

ELECT. PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R39	2.2Ω			
R40	220Ω			
R41	47K 2W			
R42	3300Ω			
R43	68K 2W			
R44	39K 2W			(47K) *
R45	470Ω			
R46	3.3Ω			
R47	10Ω 2W			

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R48	10meg			
R49	470K			
R50	680K			
R51	10Ω			
R52	10meg			
R53	220K			
R54	270K			
R55	4.7Ω			
R56	1meg			

* Alternate Value.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	WOLLENSAK PART No.	REPLACEMENT DATA
K1	Function Switch Comp.	(2) 150mmf, 82K, 820K	A177-12	Models T-1616, T-1818
	Function Switch Comp.	220mmf, 680mmf, 62K, (2) 220K	A117-8	Models T-1600, T-1800
K2	AF Amp. Grid	2000mmf, (2) 2500mmf, 3000mmf, 10000mmf, 10K, 15K, 33K	A177-13	Models T-1616, T-1818
	AF Amp. Grid	1000mmf, 1500mmf, 10000mmf, 27K, (2) 200K, 2.2meg	A177-6	Models T-1600, T-1800
K3	AF Amp. Plate	470mmf, 3300mmf, 25000mmf, (2) 270K, 1meg	A177-11	Models T-1616, T-1818
	AF Amp. Plate	100mmf, 470mmf, 3300mmf, 25000mmf, (2) 270K, 1meg	A177-7	Models T-1600, T-1800

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		WOLLENSAK PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	
L1	Equalization	A-133-8				
L2	Bias Osc.	A-132-10				

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	WOLLENSAK PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	117V @ .68A	220V @ .010A	6.3V @ 1.1A	B-130-12					
	SEC. 3	SEC. 4	SEC. 5						
	12V @ .6A								

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	WOLLENSAK PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	1.2	1	B-131-6E ①					① Alternate Part #B-131-6
		SEC. 2						
		1						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	WOLLENSAK PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T3	1500Ω CT	6-8Ω	B-131-5B ①					① Alternate Part #B-131-5
		SEC. 2						
		125Ω CT						

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	WOLLENSAK PART No.	QUAM PART No.	
SP1	5 1/4"	PM	6-8Ω	C160-7	52A1Z8	

POWER RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	WOLLENSAK PART No.	RCA PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.090A	A123-5 *	1N1763 *	40H *	SR500 *	* Silicon
M2	.090A	A123-5 *	1N1763 *	40H *	SR500 *	♦ Selenium
M3	.010A	A123-4 ♦		Model 65 ♦		

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			WOLLENSAK PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M4	3AG	1 6/10A P/T S/B	A176-2		3150I.6 (3AG 1 6/10A P/T S/B)		MDV 1 6/10	

ELECT. PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	WOLLENSAK PART No.	NOTES
M5	DC Relay	A165-3	Model T-1616, T-1818
	DC Relay	A165-1	Model T-1800, T-1600
M6	AC Relay	A165-2	
M7	Solenoid	A9-17105	Stop
M8	Sonenoid	A9-14963	Rewind
M9	Switch	A141-31	Function, Slide Type
M10	Switch	A141-37	Speed Equalization, Leaf Type, Model T-1616, T-1818
	Switch	A141-22	Speed Equalization, Leaf Type, Model T-1800, T-1600
M11	Switch	A141-23	Speaker, Slide Type
M12	Switch	A141-32	Tape Cutoff
M13	Switch	Bl41-33	Leaf Type
M14	Switch	Bl41-34	Leaf Type
M15	Switch	A141-35	Microswitch, Snap Type
M16	Contacts		Rewind
M17	Contacts		Replay
M18	Plug		Head
M19	Socket	A174-33	Head
M20	Jack	A174-24	Input
M21	Socket	A174-36	Mike Control
M22	Jack	A174-14	Preamp Output
M23	Jack	A174-5	External Speaker
M24	Socket	A174-8	Speaker
M25	Plug		Speaker
M26	Socket	A174-34	Stop Solenoid
M27	Plug	A173-22	Stop Solenoid
M28	Socket	A171-7	7-Pin Contact Control
M29	Plug		7-Pin Contact Control
M30	Socket	A171-13	9-Pin Switch Control
M31	Plug		9-Pin Switch Control
M32	Socket	A174-35	Rewind Solenoid and Motor
M33	Plug	A173-23	Rewind Solenoid and Motor
M34	Motor	C9-14957	
M35	Socket	A174-6	Power
M36	Plug		Lower Channel Stereo Input
M37	Socket	A174-8	Lower Channel Stereo Input
M38	Jack	A174-25	Stereo Preamp. Output

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1785-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT® Folder

ZENITH MODELS
SFD2503E, R, W (Ch. 5B30)

ZENITH MODELS
SFD2503E, R, W (Ch. 5B30)

MODEL SFD2503W

ZENITH MODELS
SFD2503E, R, W (Ch. 5B30)

TRADE NAME	Zenith Models SFD2503E, SFD2503R, SFD2503W (Ch. 5B30)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Illinois
TYPE SET	AC Operated 5 Tube Stereo Phono Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	110 - 120 Volts AC, 60 Cycles RATING 68 Watts, .65 Amp. @117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER 169 -106 — SEE SIMILAR V-M 1201 — PHOTOFACT SET 436 FOLDER 18 OR RECORD CHANGER MANUAL RC-12

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES

◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Left Channel AF Amp. - Right Channel AF Amp.	12AX7	V3	Left Channel Output	6BQ5
V2	Left Channel AF Amp. - Right Channel AF Amp.	12AU7	V4	Right Channel Output	6BQ5
			V5	Rectifier	5Y3GT

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■40	450	22-3046	AFH3-43-50	C0344	FP376.9	TMT-3745	TVL-3786	
B	▲40	450							
C	▲20	350							
C2	40	25	22-1156	PRS1470	BR4015	TC48	TD-40-150	TVA-1413	
C3	3	30NP		PRS7405	BBR-4-150	TCN503		TVANS-1215*	
C4	3	30NP		PRS7405	BBR-4-150	TCN503		TVANS-1215*	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	33 N330 10%	#22-2863		TCA-33		*		10TCS-Q33
C6	2200 10%		DI-2200			CCD-222	GP222	10TS-D22
C7	.0047 200V 10%		V84C2D47		PM6D47	6DP-1-472	GEM-16247	6TM-D47
C8	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C9	470 NPO 10%	#22-2302						
C10	2200 10%		DI-2200			CCD-222	GP222	10TS-D22
C11	.01 200V 10%		V84C2S1		PM4S1	4DP-1-103	GEM-1611	4TM-S10
C12	2200 10%		DI-2200			CCD-222	GP222	10TS-D22
C13	3300 10%		DI-3300			CCD-332	GP233	10TS-D33
C14	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C15	.015 200V 10%		V84C2S15		PM4S15	4DP-1-153		4TM-S15
C16	.47 200V 10%		V84C2P47		PM2P47	2DP-5-474	GEM-2047	2TM-P47
C17	47 N75 10%	#22-2376						
C18	33 N330 10%	#22-2863		TCA-33		*		10TCS-Q33
C19	2200 10%		DI-2200			CCD-222	GP222	10TS-D22
C20	.0047 200V 10%		V84C2D47		PM6D47	6DP-1-472	GEM-16247	6TM-D47
C21	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C22	470 NPO 10%	#22-2302						
C23	2200 10%		DI-2200			CCD-222	GP222	10TS-D22
C24	.01 200V 10%		V84C2S1		PM4S1	4DP-1-103	GEM-1611	4TM-S10
C25	2200 10%		DI-2200			CCD-222	GP222	10TS-D22
C26	3300 10%		DI-3300			CCD-332	GP233	10TS-D33
C27	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C28	.015 200V 10%		V84C2S15		PM4S15	4DP-1-153		4TM-S15
C29	.47 200V 10%		V84C2P47		PM2P47	2DP-5-474	GEM-2047	2TM-P47
C30	47 N75 10%	#22-2376						
C31	.01 600V		P688N-01		CUB6S1	6DP-2-103	GEM-611	6TM-S10

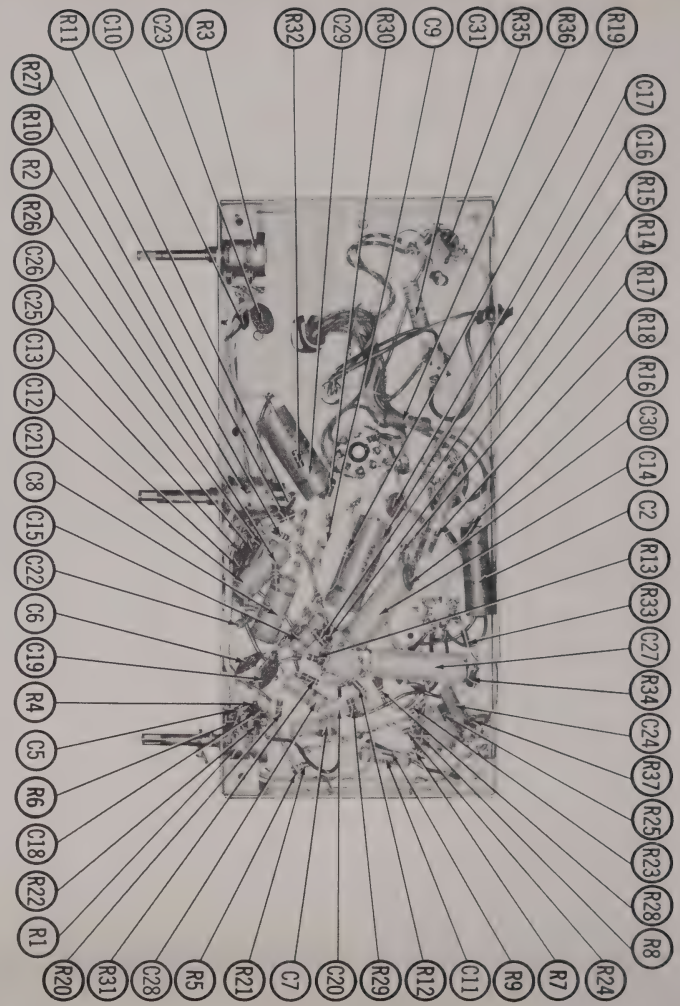
\# Zenith Part Number.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	2meg *		63-4447					Loudness, Left Channel
B	2meg *							Balance, Right Channel
R2A	1meg		63-4449	TPL-105 †				Bass, Left Channel
B	1meg			Not Req.			UE1587-S	Bass, Right Channel
C	Switch			Not Req.				Push-Pull Stereo-Monaural
R3A	1meg		63-4448	B-69	AD47-1meg-S		FA16L	Treble, Left Channel
B	1meg			SR-69	Not Req.		RU16L	Treble, Right Channel
C	Shaft			Not Req.	KSS-3		CS3500	

* Taps @ 500K and 1meg.
† New Knob required.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (IRC or EQUIVALENT)

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	150K	
R5	82K	
R6	2.2meg	
R7	56K	
R8	100K	
R9	2200Ω	
R10	270K	
R11	82K	
R12	47K	
R13	2700Ω	
R14	2200Ω	
R15	820Ω	

ITEM No.	RATING	REMARKS
R16	1000Ω	
R17	330K	
R18	150Ω 2W	Pt. #63-2019
R19	3900Ω	
R20	150K	
R21	82K	
R22	2.2meg	
R23	56K	
R24	100K	
R25	2200Ω	
R26	270K	
R27	82K	

ITEM No.	RATING	REMARKS
R28	47K	
R29	2700Ω	
R30	2200Ω	
R31	820Ω	
R32	3900Ω	
R33	1000Ω	
R34	330K	
R35	5600Ω	
R36	5000Ω 3W	IRC#PW5-5000Ω
R37	1.8meg	

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
				ZENITH PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
	PRI.	SEC. 1	SEC. 2						
T1	117V @ .65A	680VCT @ .075A	5V @ 2A	95-1743	P-3152①	PC-8409①	24R40U①	R-11IA①	① Drill New Mounting Holes.
	SEC. 3	SEC. 4	SEC. 5						
	6.3VCT @ 2.1A								

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
			ZENITH PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
	PRI.	SEC.						
T2	7200Ω	6-8Ω	95-1650	A-2904	A-3849	24S06	S-53X	
T3	7200Ω	6-8Ω	95-1650	A-2904	A-3849	24S06	S-53X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
				ZENITH PART No.	QUAM PART No.	
	SIZE	FIELD	V. C. IMP.			
SP1	10"	PM	6-8Ω	49-916	10A6AZ6	* Alternate Part #49-896
SP2	5 1/4"	PM	3-4Ω	49-920 *	52A1	
SP3	10"	PM	6-8Ω	49-916	10A6AZ6	
SP4	5 1/4"	PM	3-4Ω	49-920 *	52A1	

FUSES

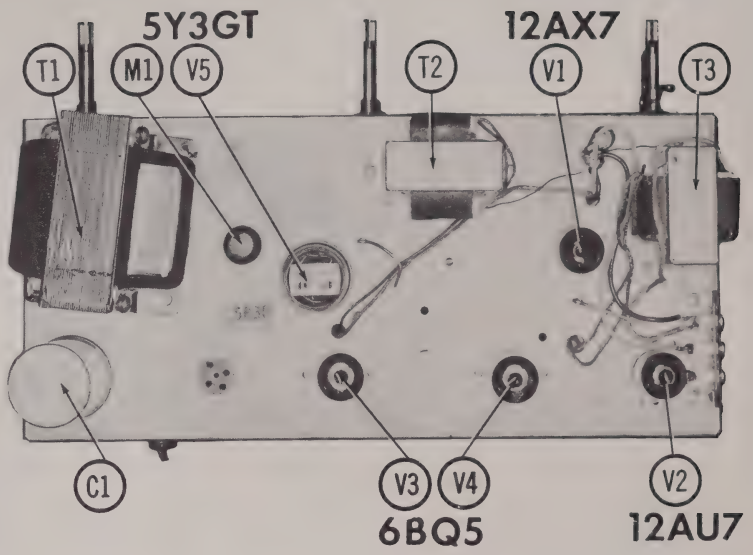
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ZENITH PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	2A 250V	136-36	62-23	312002 (3AG 2A 250V)	342001	AGC 2	HKP

PHONO CARTRIDGE & NEEDLES

*NEEDLE LISTINGS SHOWN ARE FOR RESPECTIVE REPLACEMENT CARTRIDGES ONLY.

ITEM No.	REPLACEMENT DATA								NOTES
	ZENITH PART No.		ASTATIC PART No.		ELECTRO-VOICE PART No.		SONOTONE PART No.		
	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	
M2	142-92	56-399 * or 56-401 * and 56-400 *	13TB	Not Req.	26S	S1-1 * and S3-3 *	8TA4-S	N-8TA-S *	

CHASSIS—TOP VIEW



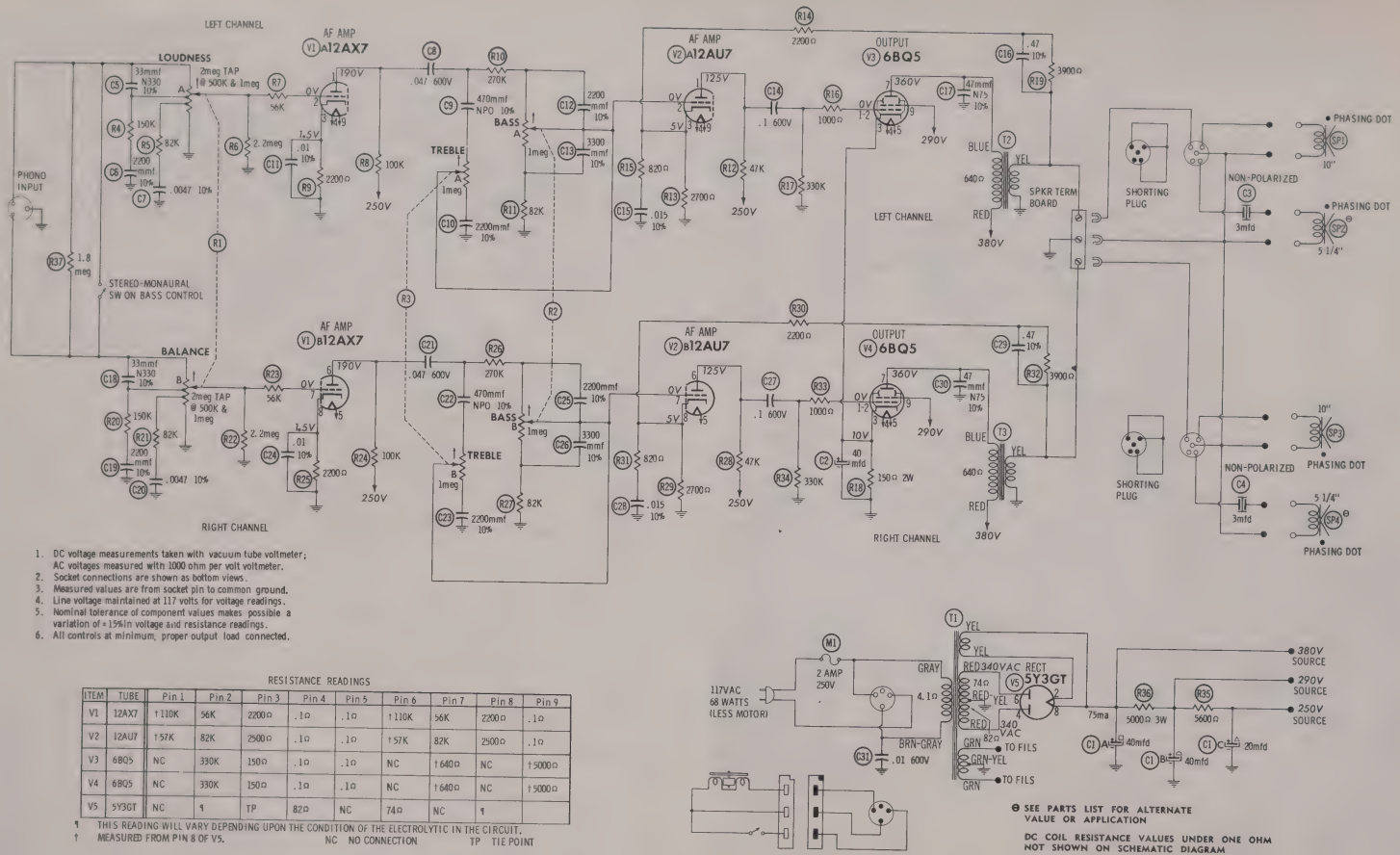
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	S-47323	Loudness, With Ring Assembly
Knob	46-2287	Balance
Knob	46-2263	Bass, Treble
Cabinet	14-2902E	With Legs, Model SFD2503E
Cabinet	14-2902R	With Legs, Model SFD2503R
Cabinet	14-2902W	With Legs, Model SFD2503W
Leg	96-219	Model SFD2503R
Leg	96-220	Model SFD2503W
Leg	96-221	Model SFD2503E

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†110K	56K	2200Ω	.1Ω	.1Ω	†110K	56K	2200Ω	.1Ω
V2	12AU7	†57K	82K	2500Ω	.1Ω	.1Ω	†57K	82K	2500Ω	.1Ω
V3	6BQ5	NC	330K	150Ω	.1Ω	.1Ω	NC	†640Ω	NC	†5000Ω
V4	6BQ5	NC	330K	150Ω	.1Ω	.1Ω	NC	†640Ω	NC	†5000Ω
V5	5Y3GT	NC	¶	TP	82Ω	NC	74Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 8 OF V5. NC NO CONNECTION TP TIE POINT

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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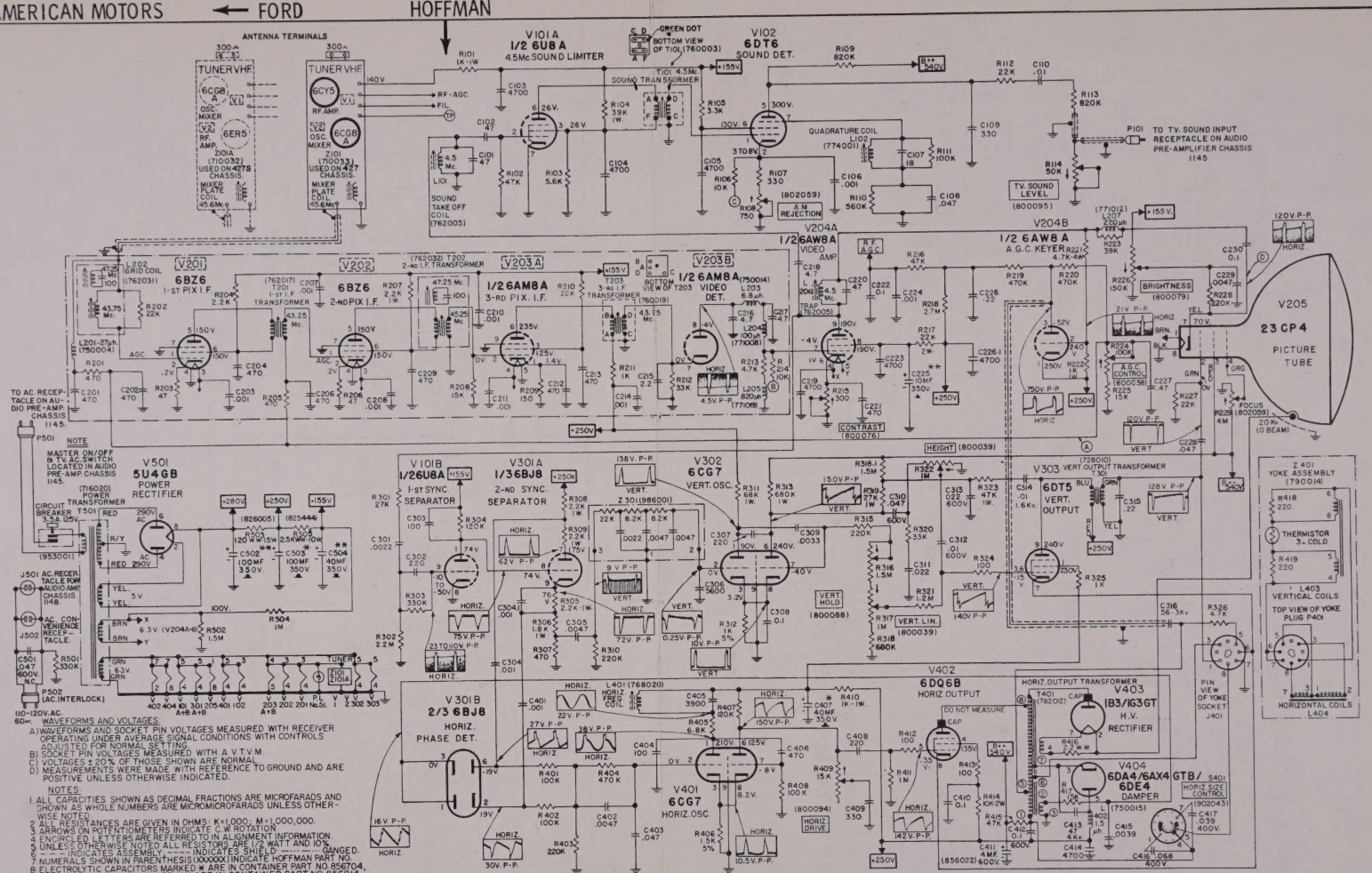
ZENITH MODELS
SFD2503E, R, W (Ch. 5B30)


ANTENNA TERMINALS
TUNER VHF
6CG8 A
6ER5
6CY5
6CG8 A
RF AMP.
OSC. MIXER
RF. AMP.
MIXER PLATE COIL 45.6Mc
V101A 1/2 6U8A 4.5Mc SOUND LIMITER
V101B 1/2 6U8A I-ST SYNC SEPARATOR
V301A 1/3 6BJ8 2-ND SYNC. SEPARATOR
V301B 2/3 6BJ8 HORIZ. PHASE DET.
V102 6DT6 SOUND DET.
V201 6BZ6 1-ST PIX I.F.
V202 6BZ6 2-ND PIX I.F.
V203A 1/2 6AM8A 3-RD PIX. I.F.
V203B 1/2 6AM8A VIDEO DET.
V204A 1/2 6AW8A VIDEO AMP
V204B 1/2 6AW8A A.G.C. KEYER
V205 23CP4 PICTURE TUBE
V302 6CG7 VERT. OSC.
V303 6DT5 VERT. OUTPUT
V401 6CG7 HORIZ. OSC.
V402 6DQ6B HORIZ OUTPUT
V403 1B3/1G3GT H.V. RECTIFIER
V404 6DA4/6AX4GTB/ 6DE4 DAMPER
V501 5U4GB POWER RECTIFIER
SOUND TRANSFORMER
QUADRATURE COIL
TV. SOUND LEVEL
A.F.C. REJECTION
BRIGHTNESS
A.G.C. CONTROL
CONTRAST
HEIGHT
VERT. HOLD
HORIZ. HOLD
VERT. LIN.
FOCUS
HORIZ. SIZE CONTROL
HORIZ. OUTPUT TRANSFORMER
VERT. OUTPUT TRANSFORMER
YOKE ASSEMBLY
THERMISTOR 3Ω COLD
VERTICAL COILS
HORIZONTAL COILS
TOP VIEW OF YOKE PLUG P401
PIN VIEW OF YOKE SOCKET J401
TO TV. SOUND INPUT RECEPTACLE ON AUDIO PRE-AMPLIFIER CHASSIS 1145
TO AC. RECEPTACLE ON AUDIO PRE-AMP. CHASSIS 1145
MASTER ON/OFF & TV. AC. SWITCH LOCATED IN AUDIO PRE-AMP. CHASSIS 1145.
CIRCUIT BREAKER 3.5A 125V
POWER TRANSFORMER
AC CONVENIENCE RECEPTACLE
110-120V. AC. 60~
DO NOT MEASURE
WAVEFORMS AND VOLTAGES:
A) WAVEFORMS AND SOCKET PIN VOLTAGES MEASURED WITH RECEIVER OPERATING UNDER AVERAGE SIGNAL CONDITIONS WITH CONTROLS ADJUSTED FOR NORMAL SETTING.
B) SOCKET PIN VOLTAGES MEASURED WITH A.V.T.V.M.
C) VOLTAGES ± 20% OF THOSE SHOWN ARE NORMAL.
D) MEASUREMENTS WERE MADE WITH REFERENCE TO GROUND AND ARE POSITIVE UNLESS OTHERWISE INDICATED.
NOTES:
1. ALL CAPACITIES SHOWN AS DECIMAL FRACTIONS ARE MICROFARADS AND SHOWN AS WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED.
2. ALL RESISTANCES ARE GIVEN IN OHMS: K=1,000; M=1,000,000.
3. ARROWS ON POTENTIOMETERS INDICATE C.W ROTATION.
4. ENCIRCLED LETTERS ARE REFERRED TO IN ALIGNMENT INFORMATION.
5. UNLESS OTHERWISE NOTED ALL RESISTORS ARE 1/2 WATT AND 10%.
6. ——— INDICATES ASSEMBLY ——— INDICATES SHIELD ——— INDICATES GANGED.
7. NUMERALS SHOWN IN PARENTHESIS (XXXXXX) INDICATE HOFFMAN PART NO.
8. ELECTROLYTIC CAPACITORS MARKED ✱ ARE IN CONTAINER PART NO. 856704, AND THOSE MARKED ✱✱ ARE IN CONTAINER PART NO. 856914.

HOFFMAN MODELS M9003, SP9003, W9003 (CH. 427)

Schematic Diagram Courtesy of Hoffman Electronics Corp.

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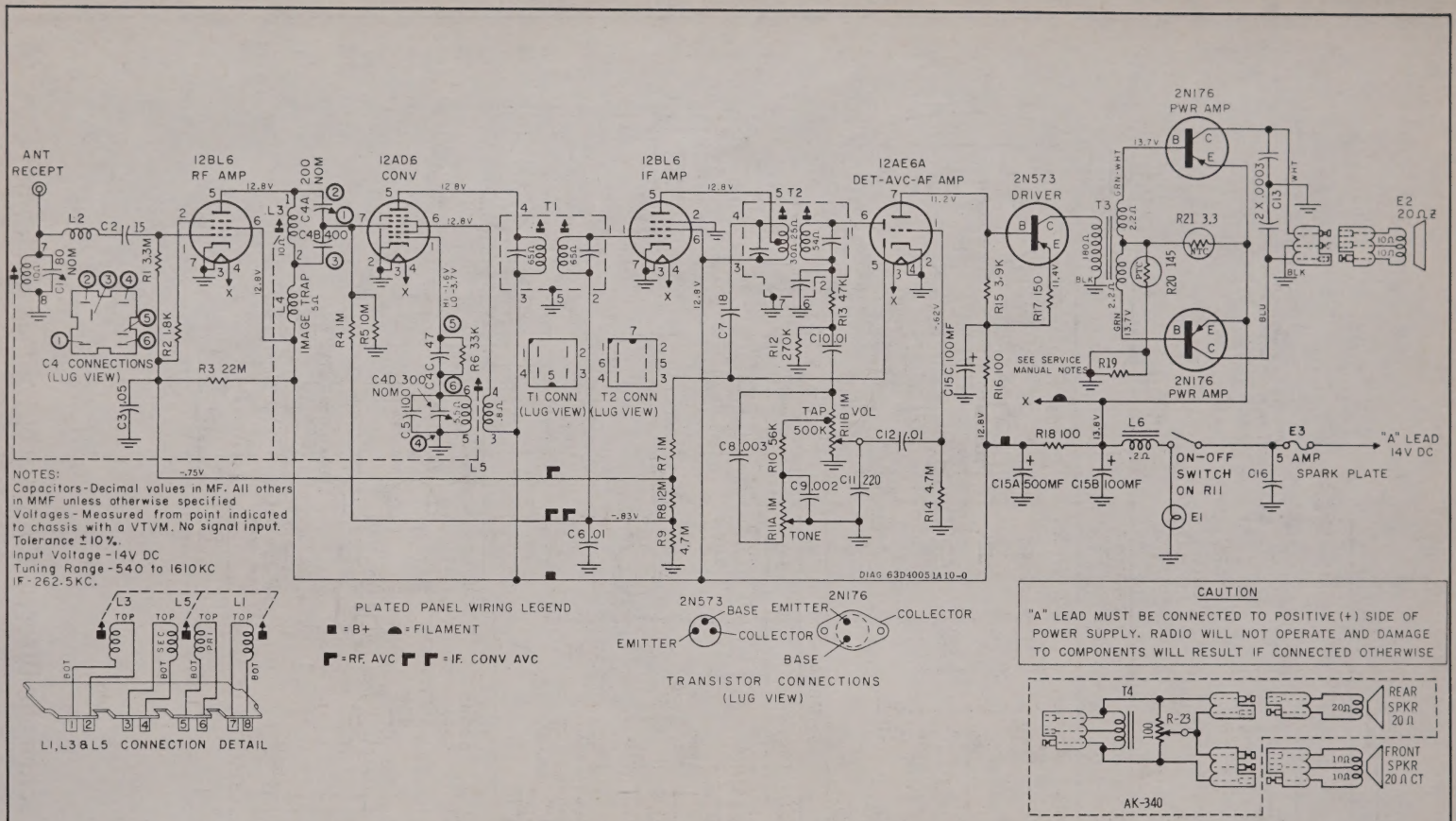
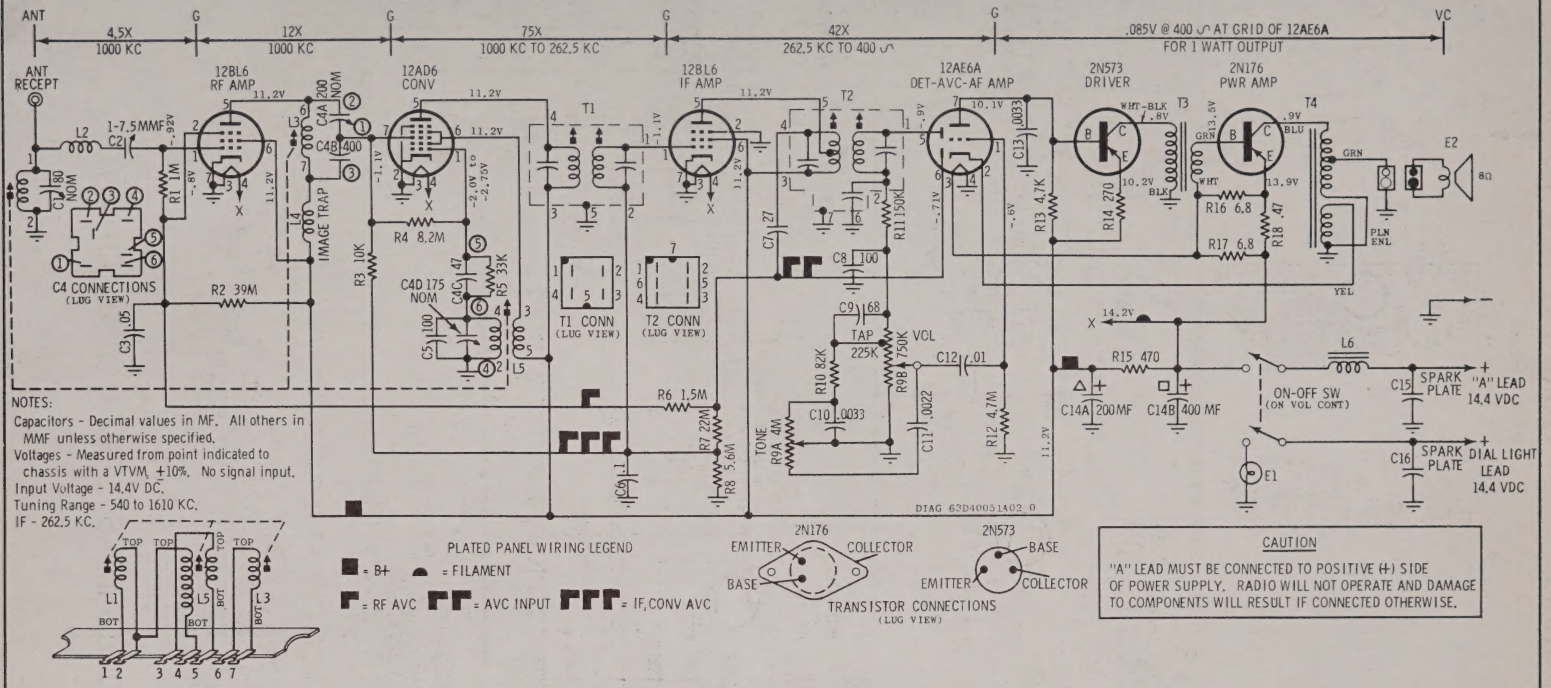

ANT RECEPT
12BL6 RF AMP
12AD6 CONV
12BL6 IF AMP
12AE6A DET-AVC-AF AMP
2N573 DRIVER
2N176 PWR AMP
2N176 PWR AMP
T1
T2
T1 CONN (LUG VIEW)
T2 CONN (LUG VIEW)
C4 CONNECTIONS (LUG VIEW)
C4D 300 NOM
IMAGE TRAP
TAP VOL 500K
TONE
SEE SERVICE MANUAL NOTES
ON-OFF SWITCH ON R11
5 AMP SPARK PLATE
"A" LEAD 14V DC
C15A 500MF
C15B 100MF
NOTES:
Capacitors-Decimal values in MF. All others in MMF unless otherwise specified
Voltages-Measured from point indicated to chassis with a VTVM. No signal input. Tolerance ±10%.
Input Voltage -14V DC
Tuning Range-540 to 1610KC
IF-262.5KC.
DIAG 63D4005 1A 10-0
L1, L3 & L5 CONNECTION DETAIL
PLATED PANEL WIRING LEGEND
■ = B+ ◗ = FILAMENT
RF AVC IF CONV AVC
2N573 BASE EMITTER COLLECTOR
2N176 EMITTER COLLECTOR BASE
TRANSISTOR CONNECTIONS (LUG VIEW)
CAUTION
"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE
T4
REAR SPKR 20Ω
FRONT SPKR 20Ω CT
AK-340

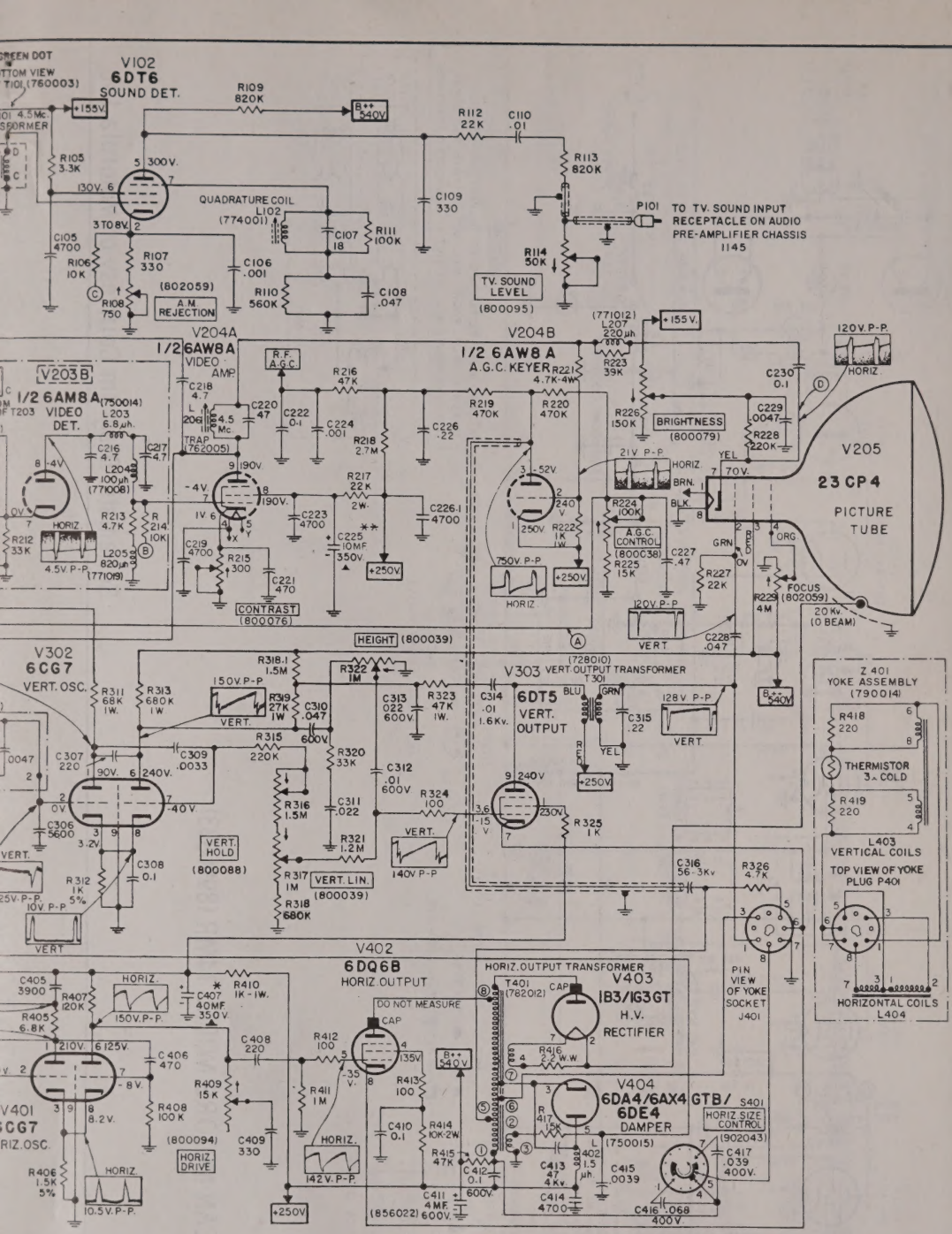
AMERICAN MOTORS MODEL 14MR (8990833)

Schematic Diagram Courtesy of Motorola Inc.



FORD MODELS 14MF (C1AF-18805-D), 14MFM (C1AF-18805-C)

Schematic Diagram Courtesy of Motorola Inc.



Schematic Diagram Courtesy of Hoffman Electronics Corp.